PHYSICS ABSTRACTS

SECTION A

of

SCIENCE ABSTRACTS

SECTION A, PHYSICS

SECTION B, ELECTRICAL ENGINEERING

Edited and Issued Monthly by

THE INSTITUTION OF ELECTRICAL ENGINEERS

In Association with

THE PHYSICAL SOCIETY

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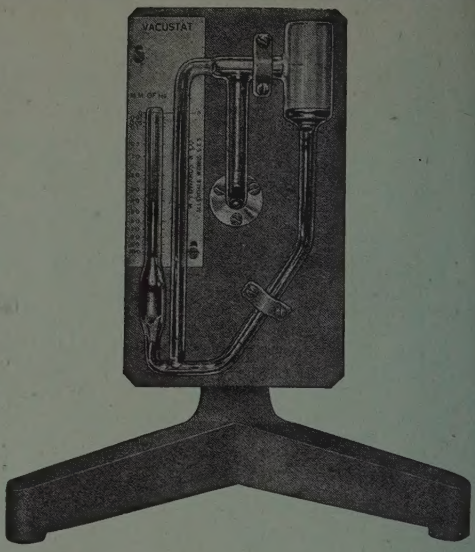

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32 2402
easurement of the modulus of rigidity of solid and d bodies. KORNFELD, M. *J. Phys., USSR*, 8, 1, 4–8, 1944.—Apparatus is described for measuring rigidity modulus of crystalline and amorphous ies, and the method may be applied without tation to substances whose viscosity exceeds poises. The theory of the method is given. L. S. G.

32 : 532.13 : 666.1 2403
be determination of the elastic and viscous properties lass at temperatures below the annealing range. es, G. O. *J. Soc. Glass Technol.*, 28, *pp.* 432–, *Dec.*, 1944.—A bending method was used for erving the development of strain under applied ss. Down to quite low temperatures the whole he strain is made up of a purely viscous part, plus ompletely reversible elastic part. The reversible in may be divided into an instantaneous com- ient and a delayed component which appears idly at first and then approaches asymptotically a max. A method was developed for the analysis the strain/time curves, based on the observation t only that part of the delayed strain which had ady appeared under load was later recovered on oval of the load, and on the assumption that the n of the decay function was similar for both fection and recovery. The total delayed elastic ain for a given applied stress is a function of the nperature, increasing from 3% of the instantaneous stic strain at 200° to 75% at 444° (T_g was 534°). ove this temperature it became increasingly ficult to separate the instantaneous and delayed rts of the elastic strain. The true viscosity at 350° s $10^{17\cdot8}$ poises.

.32 : 534.321.9 : 548.0 *see Abstr.* 2565

.32 : 548.0 *see Abstr.* 2564

.32 : 553.621 2404
Elastic constants of quartz. RAO, B. R. *Curr. Sci.*, *p.* 17, *Jan.*, 1945.

9.378.3 : 548.526 : 669.14 2405
Solution of the diffusion equation applicable to the gewise growth of pearlite. BRANDT, W. H. *J. Appl. ys.*, 16, *pp.* 139–146, *March*, 1945.—The diffusion uation is transformed to a set of co-ordinates oving with the pearlite interface and a solution plicable to the problem obtained in the form of an finite series of terms. Using the first 3 terms, the gewise velocity of pearlite growth is calculated for plain carbon eutectoid steel using data most of which e obtained by extrapolation. The values obtained ree with values for the rate of pearlite nodule growth termined by Hull, Colton, and Mehl. The velocity creases with decreasing temperature, as expected, d it is shown that this is caused by the change in the lubilities of ferrite and cementite in austenite with mperature. The theory predicts curved ferrite-stenite and cementite-austenite interfaces and the rbon concentration in austenite is shown to vary ross each of these interfaces.

39.379 : 539.501 2406
Rise of temperature on fast stretching of Butyl ubber. DART, S. L., AND GUTH, E. *J. Chem. Phys.*, 13, *pp.* 28–36, *Jan.*, 1945.—[See Abstr. 1509 (1943)]. Study of the rise in temperature on fast stretching of Butyl gum and tread stocks throws light on crystallization, internal friction, and carbon-black reinforcement as functions of elongation and other variables. For low elongations, the low-heat curves show thermo-elastic inversion. They also show that internal friction is much larger for Butyl than for Hevea. For high elongations, the high-heat curves enable one to follow the late and abrupt crystallization, characteristic for Butyl stocks. The carbon-black reinforcement of Butyl is followed for the whole range of elongations up to the breaking point. Specific carbon-black reinforcement takes place in the range of elongations before crystallization of the gum stock, but the shortening of the breaking elongation by the black excludes to a large extent the added reinforcement through crystallization.

539.381 2407
Wave equation for finite elastic strains. NADAI, A. *J. Appl. Phys.*, 16, *p.* 313, *May*, 1945.—[See Abstr. 2620, 2622 (1944)].

539.382 : 620.172.22.05 2408
The yielding phenomenon of metals. IV–VI. WELTER, G. *Metallurgia, Manchr*, *pp.* 309–315, *April*; 31–36, *May, and pp.* 80–84, *June*, 1945.—[Abstr. 1817 B (1945)].

539.384.4 : 674.03 2409
Hardwood columns subjected to loads of short duration. BULL, M. G. *J. Instn Engrs Aust.*, 17, *pp.* 50–58, *March*, 1945.—A discussion of theory as generally applied to the testing of timber is followed by an analysis of tests on columns of Australian hardwoods. The max. load-carrying capacity may be found by assuming the limiting physical properties of the column in conjunction with a relationship between direct and bending stresses at max. load as found by Warren for spruce. It is concluded that the mean behaviour of hardwood columns under combined bending and compressive stresses is substantially similar to that of softwood columns. G. E. A.

539.384.6 2410
Bending of curved thin tubes. BESKIN, L. *J. Appl. Mech.*, 12, *A1–A6*, *March*, 1945.—The stress distribution in curved tubes, and its influence on the rigidity, are examined in the case when the ratio of the radius of the centre line to the radius of the tube is great. When this ratio is small, the results relative to rigidity remain fairly accurate, while the results relative to stress distribution are incorrect and require a more complete analysis.

539.385.08 : 679.5 : 621.383.4 2411
A rapid photo-electric optical distortion tester for plastic windows. SOWERBY, J. MCG., AND WALTON, W. H. *J. Sci. Instrum.*, 22, *pp.* 71–74, *April*, 1945.—Describes an instrument suitable for use in the factory or industrial test room for the "pass-reject" testing of the optical distortion of small moulded plastic windows. The instrument incorporates a "Schlieren" optical system by which faulty windows deflect light off a stop on to a photocell so that the photocell current is a measure of the optical distortion. By

means of an electronic circuit incorporating a hard valve trigger (self-resetting), the photocell current is made to operate an indicator lamp. Standardization is effected by adjustment of the circuit just to reject a glass distorting standard. The instrument derives its supply from the a.c. mains and sufficient stabilization is incorporated so that only infrequent standardization is needed. A testing rate of 24 windows per min. is easily attained.

539.388.1 : 548.73 *see Abstr.* 2591

539.388.8 : 678 2412

Swelling of synthetic rubbers in mineral oils. POWERS, P. O., AND BILLMEYER, B. R. *Industr. Engng Chem.*, 37, *pp.* 64–67, *Jan.*, 1945.—The aniline point of hydrocarbon oils and solvents is a satisfactory index of the swelling of oil-resistant synthetic rubber compositions. The log. of the % volume increase varies inversely with the aniline point up to 100% swelling. The slope of the swelling curve is characteristic of each synthetic rubber and is not affected by loading, temperature or degree of cure. Slight swelling does not greatly decrease the tensile strength, but above 100% swelling the strength is greatly reduced.

539.388.8 : 678.7 2413

Identification of raw and vulcanized rubber-like polymers. II. Determination of swelling ratios. PARKER, L. F. C. *J. Soc. Chem. Ind.*, 64, *pp.* 65–67, *March*, 1945.—The ratios of the swellings of vulcanized rubber-like polymers in benzene, light petroleum (b.p. 40–60°), and aniline, at 25°C., are different for different polymers, but within a well-defined narrow range for each polymer, the ratios being independent of the state of vulcanization and the nature and amount of the fillers. Hence the ratios for an unknown sample may be utilized in its identification, preferably by plotting the values on a graph showing the ratios for the common types of rubber-like polymers.

539.389 2414

A theory of the Calender effect in rubber-like materials. BILMES, L. *Trans. Faraday Soc.*, 41, *pp.* 81–87, *Feb.*, 1945.—The facts relating to the Calender effect are briefly stated and illustrated by experimental data obtained with calendered plasticized polyvinyl chloride sheet. The nature of rubber-like deformation is outlined. A theory of the Calender effect is proposed in terms of a mechanical model whose relation to molecular structure is indicated. The theory postulates that temperature-dependent yield values be associated with the mechanisms of high elastic deformation and plastic flow.

539.389.3 : 539.501 2415

Pseudo-plastic phenomena with vulcanized rubber. WILDSCHUT, A. J. *Physica, 's Grav.*, 10, *pp.* 571–584, *July*, 1943.—The variations of plastic flow and relaxation with time are studied. As a result, the rate of flow (v) is defined as the ratio of the flow at const. tension to the log. of the time, and the rate of relaxation as the ratio of the decline in tension at const. elongation to the log. of the time. The rates thus defined are independent of the time. The rate of flow decreases rapidly with rise in temperature, and this is explained by considering the influence of time on crystallization and of crystallization on elastic tension. When v is measured at increasing values of the tension (σ) and v is plotted against σ, the result is a curve with a strong max. This is explained by t crystallization of the rubber. A study of such curv shows that, at room temperature, a large part of t total flow is reversible and must be considered pseudo-flow, which is caused by a retardation in t crystallization and diminishes at increasing te perature. A consequence is that the total rate of flo passes through a min. as the temperature increas The phenomenon of pseudo-relaxation is also studie

L. S.

539.4 : 679.5 : 621.315.619 24

Effect of temperature on strength of laminat NORELLI, P., AND GARD, W. H. *Industr. Engng Chem* 37, *pp.* 580–585, *June*, 1945.—[Abstr. 1969 B (1945

539.4.01 : 679.5 24

Effect of some environmental conditions on t mechanical properties of cellulose acetate and cellulo nitrate plastic sheets. LAWTON, T. S., JR., CARSWEL T. S., AND NASON, H. K. *Trans. Amer. Soc. Mec Engrs*, 67, *pp.* 23–30, *Jan.*, 1945.—The effect ambient temperature, relative humidity, testing spee and sheet thickness on the tensile properties, and temperature on the compressive, flexural, shear, a impact properties of cellulose acetate and cellulo nitrate plastic sheets, is shown in detail and t general nature of these effects is summarized.

539.4.016.3 : 669.721 24

An exploration of the problem of superheating magnesium-base alloys. FOX, F. A., AND LARDNER, *J. Inst. Met.*, 71, *pp.* 1–22, *Jan.*, 1945.—The grai refining effect is confined to alloys containing A and tendencies to grain-coarsening are introduced the superheating time is too long or the temperatu too high. Data are given relating tensile properties grain-size in Al-containing alloys. The microstru tures of superheated alloys differ characteristical from those of the unsuperheated material, and th difference persists even after solution treatment, t unsuperheated alloy giving a mixed grain-siz Grain-sizes are recorded for an alloy, superheated a unsuperheated, cast as rods of various cross-section Stirring just before casting does not eliminate t grain-refinement effect of the superheating.

539.415.2 : 621.93.01 24

Mechanics of the metal cutting process. II. Plastici conditions in orthogonal cutting. MERCHANT, M. *J. Appl. Phys.*, 16, *pp.* 318–324, *June*, 1945.—[Abst 2295 B (1945)].

539.42 : 541.64 *see Abstr.* 2524

539.42 : 677.2 : 539.216.1 *see Abstr.* 2385

539.43 : 669.018 24

Dependence on stress of damping capacity of alloy GEMANT, A. *Mech. Engng, N.Y.*, 67, *pp.* 33–3 *Jan.*, 1945.—A consideration of damping as caused the alternating plastic flow that takes place duri vibration. The decrement is converted into transie flow resistance which is plotted against the stress f a number of alloys of steel, Cu and Pb. Certain these have damping characteristics with pronounc dependence on the stress, and this characteristic particularly promoted by additions of Si and N Heat treatment is not considered. G. B.

539.431 24

On fatigue failure under triaxial static and fluctuati stresses and a statistical explanation of size effe FOWLER, F. H., JR. *Trans. Amer. Soc. Mech. Engi*

pp. 213–216, *April*, 1945.—A criterion of safe gue characteristics of manufactured units is posed. A basic theory of failure is recommended ch is a modification of Drowan's [Abstr. 1906 9)]. Explanations of the effect of specimen size the stress gradient on the endurance limit may be ful in avoidance of the possibility of failure or in tuating the probability that a failure will occur.

G. E. A.

.431 : 678 2422

atigue failure of GR-S tread stocks. WINN, H., SHELTON, J. R. *Industr. Engng Chem.*, 37, 67–70, *Jan.*, 1945.—The effect of the state of cure, perature of test and oxidation, on the fatigue ure in rubber during flexing in air and in N_2 taining small amounts of O_2 is investigated erimentally.

.434 : 679.5 2423

Creep properties of moulded phenolic plastics at vated temperatures. GAILUS, W. J., AND TELFAIR, *Trans. Amer. Soc. Mech. Engrs*, 67, *pp.* 253–258, ry, 1945.—Tension creep data are reported up to 00 hr. and recovery data up to 250 hr. Modulus-elasticity values were obtained at the beginning and 1 of the 1 000 hr. tests. Studies included the effect moisture content on creep properties.

.501 2424

Experiments on plasticity. I–II. MAGEY, H. H. *ans. Brit. Ceram. Soc.*, 43, *pp.* 5–28, *Jan.*, 1944.— o simple methods of experiment on plastic clay given and the data obtained by these methods cussed. Clay bars are subjected to constant sional and compressional stresses less than those cessary to produce continuous flow. It is shown at clay is not elastic but deforms plastically even the smallest stresses. De-aired clay bars are tended at a constant speed and a continuous record the stress involved is obtained. A wide range of eeds is used and it is shown how the behaviour of bar varies with the speed. The extension to max. ess increases as the rate of extension is increased. onsiderable variations in behaviour of apparently entical bars are found, but the stress/extension curves ree with the formula $f = B(1 - e^{-aE})$, where f is e true stress per unit area, E is the extension and and B are constants for any one experiment.

9.501 2425

Systems manifesting superposed elastic and viscous haviour. TOBOLSKY, A. V., AND ANDREWS, R. D. *Chem. Phys.*, 13, *pp.* 3–27, *Jan.*, 1945.—A general olecular theory describing the behaviour of matter nder stress is discussed and related to previous vestigations and to experimental observations. xperimental results on relaxation and creep of ubbers are interpreted in terms of modern structural oncepts. These substances exhibit 3 regions of tress/temperature/time dependence. At intermediate emperatures there exists a region of relative stability which the statistical-thermodynamic theory of ubber elasticity is valid. At elevated temperatures elaxation and creep are caused by chemical changes nvolving the rupture and formation of primary alence bonds. These chemical changes, which are esponsible for the ageing of rubber, can be isolated and studied by appropriate experimental techniques. At low temperatures relaxation and creep are caused by the slipping of secondary interchain bonds which are breaking and reforming in times comparable with experimental times of measurement.

539.501 2426

Significance of power-law relations in rheology. CAFFYN, J. E., AND BLAIR, G. W. SCOTT. *Nature, Lond.*, 155, *pp.* 171–172, *Feb.* 10, 1945.—[See Abstr. 2427 (1945)].

539.501 2427

Power laws for the dependence of strain on time and stress. WHITEHEAD, S. *Rep. Brit. Elect. Allied Industr. Res. Ass., Ref. L/T*151, 10 *pp.*, 1945.—A Laplace transform method is used to show that it is impossible for a linear system to give rise to a power law; but such a law may approximate the behaviour over a limited range of time. If we abandon the hypothesis of linearity but assume the phenomena are still superposable we find that the law of variation with time is given by an integral equation. Since the latter is the limit of a system of linear equations it follows from the previous work that a power law cannot apply to superposable phenomena. There is a section on the mechanism of relaxation, and the report has particular reference to the rheological properties of dielectrics [See Abstr. 2426 (1945)].

L. S. G.

539.501 2428

A classification of rheological properties. REINER, M. *J. Sci. Instrum.*, 22, *pp.* 127–129, *July*, 1945.—An outline is given of the method of describing the behaviour of complex materials under strain in terms of dashpots, springs, etc., various simple combinations ascribed to St. Venant, Kelvin and others being described. A proposal is made to classify rheological properties in terms of the ideal bodies possessing them. The method of application to a new type of material is illustrated by considering flour dough, as examined by Scott-Blair and Schofield. Two rheological properties, dilatancy and strength, are excluded from the proposed scheme. A. W.

539.501 : 532.133 *see Abstr.* 2173

539.501 : 539.379 *see Abstr.* 2406

539.501 : 539.389.3 *see Abstr.* 2415

539.501 : 662.66 2429

Plastic characteristics of coal. BREWER, R. E. *Industr. Engng Chem.*, 36, *pp.* 1165–1168, *Dec.*, 1944.—A detailed study of chemical and petrographic composition and physical properties of 19 low-, medium-, and high-volatile A bituminous coals in relation to Gieseler max. fluidity. Factors of chemical and petrographic composition found to contribute toward increasing the fluidity of a coal above that expected from its rank are high anthraxylon and translucent attritus contents and the presence of cannel coal. For coals of similar rank, those of higher physical strength generally show a higher max. fluidity. Factors that reduce the fluidity of a coal below that expected from its rank are high contents of oxygen, ash, opaque attritus, and fusain.

539.501 : 678 2430

Plastication and processing of GR-S. VILA, G. R. *Industr. Engng Chem.*, 36, *pp.* 1113–1119, *Dec.*,

1944.—Viscosity or plasticity measurements bear a direct relation to the power required and the heat generated while tubing GR-S, but do not correlate with tubing rates. The latter depend upon worm speed and the surface condition of the mixed compound, smoother surfaces tending to give faster speeds. The increase in cross-sectional area upon tubing bears a direct relation to surface smoothness, smoother compounds exhibiting less swell. It is possible to predict tubing characteristics from the plasticity or viscosity of the finished compound in conjunction with an estimate of its relative surface smoothness. The latter quality may be achieved by hot breakdown, increasing softener ratios, or increasing pigment ratios. High-temperature plastication, however, exerts a deleterious effect on the physical properties of the vulcanizate. There is evidence that a higher degree of benzene solubility in the raw polymer may result in a more favourable processing history, but additional examples are required before conclusions are justified. When working with normal GR-S, cold milling is found to increase benzene solubility whereas hot milling or Gordon plastication reduces it and, presumably, results in a gelled polymer.

539.536 2431

Abrasion of porcelain balls. CHESTERS, J. H. *Nature, Lond.*, 155, *p.* 485, *April* 21, 1945.

539.536 : 676.3 2432

Determination of the erasing qualities of paper. CODWISE, P. W. *Paper Tr. J.*, 120, *TAPPI Sect.*, *pp.* 73–76, *Feb.* 22, 1945.—The (Howard Smith) mechanical erasure tester described consists of a uniformly moving and controlled abrading surface (one of a series of standardized grit abrasive cloths), which is made to rub the paper surface under a total head wt. of 327 g., at 120 strokes/min., by means of a motor-driven flywheel with an eccentric arm. The test is made on a cross-hatched line on the paper drawn with a drawing pen set to 0·0001 in., and using the TAPPI standard (T431 m-41) ink. Results are tabulated for each side of 5 varied papers. In assessing the erasing quality of paper, the time to achieve erasure, the smoothness and ink-resisting properties of the surface after erasure, the amount of paper removed by the erasure, and the tendency of the paper to "fuzz up" during erasure, should all be taken into account. J. G.

539.56 : 548.0 2433

A statistical theory of the brittle strength of real crystals. FRENKEL, J. I., AND KONTOROVA, T. A. *J. Phys., USSR*, 7, 3, *pp.* 108–114, 1943.—A theory is developed which is more strict and accurate than previous theories. The probability of encountering a given value for the brittle strength of a crystalline material is calculated and from this the most probable value of the brittle strength is deduced, this depending upon the volume of the specimen. The results are compared with those of Weibull [*Proc. Roy. Swedish Inst. Engng Res.*, No. 151, 1939]. L. S. G.

539.56 : 666.1 2434

The mechanism of brittle rupture in glass. MURGATROYD, J. B. *J. Soc. Glass Technol.*, 28, *pp.* 406–431 (*T*), *Dec.*, 1944.—The suggestion is made that Griffith "flaws" consist of pockets of quasi-viscous material surrounded by larger 3-dimensional aggre gates, and that, when the pocket material has yielde to an applied stress, the fact that it then carries n load makes the pocket the equivalent of a "hole" i the glass. The time elapsing before breakage occu is explained as being due to the time required for th stress in the quasi-viscous material to relax. By mean of a model representing the stress concentration at pocket, an equation is derived relating the breakin strength with time.

539.574 : 667.7 243

Nitrocellulose lacquers. KOCH, W., PHILLIPS, H. C AND WINT, R. *Industr. Engng Chem.*, 37, *pp.* 82–8 *Jan.*, 1945.—Non-volatile content can be increased i nitrocellulose lacquers by using lower-viscosity nitro celluloses and larger proportions of non-oxidizin alkyd resins with a more active solvent, or by applyin the lacquers at temps. up to 70°C. The gain in no volatile content contributed by each factor is cumu lative.

539.61 243

Adhesion of lubricated metals. BOWDEN, F. P., AN MOORE, A. J. W. *Nature, Lond.*, 155, *pp.* 451–45 *April* 14, 1945.—An examination of the contours c solid surfaces shows that the real area of contac between two surfaces is only a small fraction of th actual apparent area of contact, so that quite sma loads develop large pressures at the few points c contact and local adhesion and welding occurs at thes points. A curved Cu slider loaded by 4 kg was move over a mild steel surface at 0·01 cm. sec.$^{-1}$, an when the surface was clean, many tiny particles c Cu were left adhering to the steel, the Cu being firml welded to the steel. The shearing away of this C caused a plucking up of the steel surface, with consequent wearing away of the steel, and the coef of friction was 0·6–0·7. When the surface wa lubricated, the friction dropped to 0·15, but th adhesion of the Cu to the steel surface, although muc less than in the dry test, was still quite considerabl When Cu and Pt were used, the surface density of th Cu adhering to dry Pt was 2×10^{-5} gm./mm.^{2} c track, while with lubricated Pt the value wa $1{\cdot}7 \times 10^{-7}$ gm./mm.^{2} A. C. V

539.62 : 532.516 243

The Hardy coefficient for instrument oil. BLOOMEN THAL, S. *Proc. Amer. Phys. Soc., Chicago, Dec.* 1 *an* 2, 1944. *Abstr. in Phys. Rev.*, 67, *p.* 61, *Jan.*-1 *and* 1 1945.—The coefficient of static friction μ for glass o glass was measured by the inclination method on a apparatus which functions automatically. A numbe of instrument oils, suggested as possible substitute for genuine porpoise jaw oil, were tried. Addition c 1% glyceryl monoricinoleate to a pure lubricating flui caused a decrease in μ from 0·26 to 0·13 because c boundary layer formation; μ for M 56 A Elgin Watc Oil was 0·17 when 100 g. total load is used.

539.62 : 669.14 243

Metallurgical transformations in metal surface under conditions of boundary lubrication. SAKMANN B. W. *Proc. Amer. Phys. Soc., New York, Jan.*, 194 *Abstr. in Phys. Rev.*, 67, *p.* 200, *March* 1 *and* 1 1945.—The surfaces of steel flats run-in on rotatin cast-iron discs under lubricated conditions may sho metallurgical transformations. The transforme

aterial is considerably harder than the underlying eel and protrudes over initially smooth surfaces by veral microns. The experiments include etching sts, microhardness tests, X-ray diffraction pictures, fferent heat treatments of the transformations, and spection of the micro-structure of the transformed aterial and the transition region between the ansformation and the bulk material of the steel. rom the value of the friction force on the stationary at and the linear velocity of the rotating disc, it is ossible to determine the heat produced during the nning-in process.

41.113 2439

High-temperature heat contents of sodium metasilicate and sodium disilicate. NAYLOR, B. F. *J. Amer. Chem. Soc.*, 67, *pp.* 466–467, *March*, 1945.—Heat ontents of Na_2SiO_3 and $Na_2Si_2O_5$ were determined etween 298·16° and 1 773°K. The heat of fusion of Na_2SiO_3 was determined, but glass formation precluded a value being obtained for $Na_2Si_2O_5$. Algebraic equations summarizing the results are iven. W. R. A.

541.122.2 : 669.215 2440

The solubility of certain metals in gold. OWEN, E. A., AND ROBERTS, E. A. O'D. *J. Inst. Met.*, 71, *pp.* 213–254, *May*, 1945.—The α-boundaries of 12 gold alloy systems (Be, Al, Zn, Ga, Ge, As, Cd, In, Sn, Sb, Hg, Pb) were investigated by the X-ray method. Parameter/composition curves are drawn for the α-phase alloys of each system in which the solute element has a range of solubility. The effect of various factors on maximum solubility is briefly discussed. [See Abstr. 1514 (1939)].

541.123.1.012.6 2441

Vapour-liquid equilibrium constants for benzene, toluene, and methylcyclohexane. DRICKAMER, H. G., AND BRADFORD, J. R. *Industr. Engng Chem.*, 36, *pp.* 1144–1145, *Dec.*, 1944.

541.123.2 2442

Distribution equation. CAMPBELL, J. A. *Industr. Engng Chem.*, 36, *pp.* 1158–1161, *Dec.*, 1944.—The application of the Freundlich equation to the correlation of data relating to the distribution of a solute between any two phases (gas-liquid, liquid-liquid, gas-solid, or liquid-solid) is suggested. This equation is readily adaptable to the usual methods of calculation involved in absorption and extraction.

541.123.2 2443

The molecular condition of phenols in benzene solution. DAVISON, J. A. *J. Amer. Chem. Soc.*, 67, *pp.* 228–233, *Feb.*, 1945.—From determination of the freezing points of solutions of Ph_3CH in C_6H_6 in an apparatus designed for the thermo-electric measurement of the freezing points of dilute solutions (0·002–0·1 M) the cryoscopic constant of the solvent was calculated as $5·088 - 0·0548\Delta T$. The freezing points of solutions of PhOH, *o*- and *p*-$CH_3C_6H_4OH$, and *m*- and *p*-$NO_2C_6H_4OH$ in C_6H_6 were found. PhOH was shown to form solid solutions in C_6H_6, and the partition coefficient of the solute between solid and liquid C_6H_6 was calculated to be 0·41. Solutions of $PhNO_2$ obeyed the ideal law to ±2% below 0·1 M.; there was no evidence of solid solution formation. The deviations from ideal behaviour shown by *o*-$CH_3C_6H_4OH$, *p*-$CH_3C_6H_4OH$, *p*-$NO_2C_6H_4OH$, and *m*-$NO_2C_6H_4OH$ increased in the order given. Equilibrium constants for dimer formation by these substances, and by 2 : 4-$(NO_2)_2C_6H_3OH$, which is chelated, were calculated. W. R. A.

541.123.2 ; 536.7 *see Abstr.* 2283

541.123.3 2444

Liquid-vapour equilibrium in methane-ethylene-isobutane system. BENEDICT, M., SOLOMON, E., AND RUBIN, L. C. *Industr. Engng Chem.*, 37, *pp.* 55–59, *Jan.*, 1945.—Liquid-vapour equilibrium data are presented for 37·78° and 71·11°C. and 34·02 and 68·05 atm. The data agree with previous predictions. [Abstr. 871 (1943)].

541.123.33 : 532.733 *see Abstr.* 2191

541.123.5 2445

Some properties of organic ion-exchange materials. HOLMES, E. L. *J. Soc. Dy. Col., Bradford*, 61, *pp.* 39–40, *Feb.*, 1945.—Two types of reactive synthetic resins are used as cation- and anion-exchangers—the former owing their property to the presence of sulphonic-groups and the latter to basic N groupings. Materials other than synthetic resins have not met with the same success. For utility, the main criterion is insolubility especially for use in water treatment where it is essential both for the purity of the treated water and for the life of the materials themselves. Materials which contain replaceable H atoms obtain a fresh supply of ions by treatment with dilute acid solution. The anion-exchanger can have renewal by treatment with dilute caustic, carbonate or bicarbonate alkali. Natural waters passing through the two exchangers have their electrolyte content reduced by at least 95%, and treated water has practically the quality of distilled water. H. H. HO.

541.123.5 2446

Liberation of H^+, Al^{+++} and Fe^{+++} ions from hydrogen clays by neutral salts. MUKHERJEE, J. N., AND CHATTERJEE, B. *Nature, Lond.*, 155, *pp.* 268–269, *March* 3, 1945.

541.123.7 : 518.3 2447

Representation of equilibrium constant data. SCHEIBEL, E. G., AND JENNY, F. J. *Industr. Engng Chem.*, 37, *pp.* 80–82, *Jan.*, 1945.—A nomograph gives the equilibrium-constant data for hydrocarbon mixtures over a wide range of temp. and pressures. Its construction is empirical, with the temp. scale based on the liquid fugacity of a reference substance and the pressure scale based on its vapour fugacity.

541.124 2448

Kinetics of wood saccharification. Hydrolysis of cellulose and decomposition of sugars in dilute acid at high temperature. SAEMAN, J. F. *Industr. Engng Chem.*, 37, *pp.* 43–52, *Jan.*, 1945.—A method is described for hydrolyzing small samples of cellulosic materials in glass bombs by heating with direct steam in a rotating autoclave. The decomposition rates of glucose and other sugars in dilute acid were investigated, and the decomposition found to follow the laws of a first-order reaction. The energy of activation of the decomposition of glucose appeared to be independent of the acid conc. over the range 0·4–1·6% H_2SO_4, and averaged 32 800 cal. The rate of reaction increased 125% with a 10% rise in temp.

between 170° and 190°C. The energy of activation in the hydrolysis of Douglas fir was independent of the acid concentration and averaged 42 900 cal.

541.124 2449

Quantitative determination of methylglyoxal, and the mechanism of its reaction with hypoiodite solution. Woo, S. C., and Chang, S. T. *J. Chem. Soc., pp.* 162–165, *March*, 1945.

541.124 : 541.64 : 541.145 *see Abstr.* 2491

541.124 : 577.15 2450

Energy relationships in enzyme reactions. Fruton, J. S., Ball, E. G., Bergmann, M., Kalckar, H. M., Meyerhof, O., and Smythe, C. V. *Ann. N.Y. Acad. Sci.*, 45, 9, *pp.* 357–435, 1944.—The series of papers is the result of a conference on Energy Relationships in Enzyme Reactions held by the Section of Physics and Chemistry of The New York Academy of Sciences, February 11 and 12, 1944. Introductory remarks to the Conference on Energy Relationships in Enzyme Reactions, Fruton, J. S.; Energy relationships of the oxidative enzymes, Ball, E. G.; Energy relationships in glycolysis and phosphorylation, Meyerhof, O.; The function of phosphate in enzymatic syntheses, Kalckar, H. M.; The significance of coupled reactions for the enzymatic hydrolysis and synthesis of proteins, Bergmann, M., and Fruton, J. S.; Some enzyme reactions of sulphur compounds and their possible interrelationship, Smythe, C. V.

541.124 : 676.1 2451

Isolation and utilization of lignosulphonic acids. Pepper, J. M. *Pulp. Pap. Mag. Can.*, 46, *pp.* 83–91, *Feb.*, 1945.—A review, with extensive bibliography, of recent work on the chemical mechanism of the sulphite pulping process for wood, the classification of the lignosulphonic acids, their industrial recovery by evaporation or precipitation, and their properties and utilization. The last includes uses as a fuel, and as a source of vanillin, tanning agents, dyes, binding materials, lignin plastics, emulsifying agents, lubricants, decolorizing agents, bleaching agents, hydrogenation products, and fertilizers. J. G.

541.124/.127 2452

Kinetics of the base-catalyzed reaction of pseudo-*l*-menthyl *l*-*o*-benzoylbenzoate with methanol. Schaefgen, J. R., Verhoek, F. H., and Newman, M. S. *J. Amer. Chem. Soc.*, 67, *pp.* 253–257, *Feb.*, 1945.—Polarimetric measurements of the reaction in the presence of methylate ion to form methyl *o*-benzoylbenzoate shows it to be pseudo-first order, and specifically catalyzed by methylate ions. The activation energy is 11 000 g.cal. No primary salt effect was detected. Fission of the pseudo ester takes place between the alcoholic oxygen and the carbonyl carbon of the acid. A mechanism for the reaction is postulated. W. R. A.

541.124/.127 : 541.144.7 *see Abstr.* 2488

541.124/.128 : 535.243 *see Abstr.* 2223

541.124.7 : 541.135.2 *see Abstr.* 2480

541.124.7 : 541.145 *see Abstr.* 2492

541.124.7 : 541.57 : 541.144.7 *see Abstr.* 2489

541.126 2453

The spontaneous combustion of hay. Firth, J. B., and Stuckey, R. E. *J. Soc. Chem. Ind., 64, pp.* 13–17, *Jan.*, 1945.

541.126 245

Mechanism of the oxidation of coal. Jones, R. E. and Townend, D. T. A. *Nature, Lond., 155, pp.* 424–425, *April* 7, 1945.

541.126 : 662.4 245

Determining the initiating efficiency of detonator Grant, R. L., and Tiffany, J. E. *Industr. Engn Chem. (Analyt. Edit.)*, 17, *pp.* 13–19, *Jan.*, 1945.– The miniature-cartridge test is based on the princip that the ability of a detonator to initiate an insensitiv explosive constitutes the best means of measuring i initiating efficiency. The experimental techniqu combines the features of the sand test and the TNT iron-oxide insensitive-powder test. A unique operatic is the subtraction of a detonator blank. This achieve a measurement of actual resultant effect of detonato in producing a greater or lesser degree of detonatic in an insensitive explosive. Results of tests a presented as curves for $Hg(CNO)_2$–$KClO_3$ (80–2 detonators, and tetryl-base detonators. From thes a procedure for a routine test is developed an outlined.

541.127 24

The thermal decomposition of mercuric fulminat Narayana, P. Y. *Curr. Sci.*, 13, *pp.* 313–315, *Dec* 1944.

541.127 24

Kinetics in acid media: the correlation of reactio rates with acidity function. Deane, C. W. *J. Amer Chem. Soc.*, 67, *pp.* 329–331, *Feb.*, 1945.—Acidi function data for fuming H_2SO_4 are correlated wi kinetic data for the decompositions of certain organ acids in this medium. W. R.

541.127 24

The mechanism of the hydrogen fluoride catalys alkylation of toluene by *t*-butyl chloride. Pearlso W. H., and Simons, J. H. *J. Amer. Chem. Soc.*, 6 *pp.* 352–362, *March*, 1945.—The alkylation of PhM by *t*-BuCl, catalyzed by HF, has been followed by t rate of increase of pressure in a special all-met apparatus the inner surface of which is Au plate With H_2O, MeOH, Et_2O and hexamethylacetone promoters, the rate of reaction increases with i creasing conc. of promoter, but all give essentia the same effect at the same molar conc. The equatio of Sprauer and Simons [Abstr. 2426 (1942)] a modified to correlate the rate measurements in a one experiment, but their equations and theory a essentially confirmed. Rate measurements and t effects of the promoters confirm the contribution the amphoteric medium effect to the mechanism the reaction. A one-step, condensed phase, catalyze and promoted reaction as the essential factor in t mechanism is shown to be satisfactory from kine and reasonable from energy consideratio Mechanisms involving ions or free radicals as int mediates are shown to be untenable from ener considerations. W. R.

541.127 : 541.128 *see Abstr.* 2466

541.127 : 541.128.1 24

Kinetics of the catalytic dehydrogenation of alcoh and glycols in the gaseous state. Neish, A. C. *Cane*

. *Res. B*, 23, *pp.* 49–69, *March*, 1945.—The catalytic ehydrogenation of several alcohols and glycols, in he gaseous state, was found to be a first-order process beying the Arrhenius relation for variation of rate vith temperature. Hence a large body of experiental data can be expressed by 2 constants that nable a ready comparison of different catalysts. A porous Cu catalyst was the most satisfactory. The allacy of calculating the energy of activation from the emperature coefficient in this type of reaction is ointed out. Primary alcohols are dehydrogenated nore slowly than secondary because the resulting ldehydes reversibly depress the activity of the catalyst, vhile methyl ketones have no measurable effect. Diacetyl acts as an aldehyde in this respect. The -glycols form α-hydroxy aldehydes and ketones that epress the activity of the catalyst to a low but onstant level. Rapid poisoning of the catalyst at onstant temperature is a first-order process. A egular relation exists between the temperature of eduction and the activity of the catalyst.

541.127 : 541.57 : 536.66 2460

Rates of pyrolysis and bond energies of substituted rganic iodides. II. BUTLER, E. T., MANDEL, E., AND OLANYI, M. *Trans. Faraday Soc.*, 41, *pp.* 298–306, *June*, 1945.—A continuation of the account of the yrolysis of organic iodides at low pressures and rief times of reaction [Abstr. 920 (1943)]. Under hese conditions the rates are determined by the rimary decomposition XI = X + I and thus characerize the bond energy C–I in various compounds XI. The paper contains data concerning the pyrolysis of yclohexyliodide, β-phenylethyliodide, *iso*propyliodide, *t*-butyliodide, dichloroiodomethane, dibromoiodomethane, β-chloroethyliodide and iodoform. For the first two of these, the bond energy could be determined with considerable certainty, since the value of the activation energy was the same whether calculated as

$$Q = -RT^2 \mathrm{d}\log_e k_1/dT \text{ or as } Q^* = 2{\cdot}3RT(13 - \log k_1)$$

where k_1 is the mono-molecular rate constant.

541.127 : 542.929.4 2461

Alkaline permanganate oxidation of certain condensed cyclic compounds including coal. WARD, J. J., KIRNER, W. R., AND HOWARD, H. C. *J. Amer. Chem. Soc.*, 67, *pp.* 246–253, *Feb.*, 1945.—Apparatus has been devised and analytical methods have been worked out for, inter alia, following quantitatively the rate of reaction of condensed cyclic compounds with alkaline permanganate, permitting work to be done on samples of 500–800 mg. For comparison, a sample of a typical bituminous coal was investigated under identical conditions. The rate of oxidation diminished in the following order: tetrahydronaphthalene, bituminous coal, pyrene, naphthacene, diphenylene oxide, carbazole, decacyclene and triphenylene; the nearly saturated structures were least reactive of all. A qualitative correlation between the rates of oxidation and "double bond character" of certain polycyclic hydrocarbons was found. Significantly higher rates of oxidation were found than have been previously reported for some of these compounds, probably due to the excess permanganate present in the early stages of the reaction.

541.127.2 : 616.9 2462

The law of mass action in epidemiology. WILSON, E. B., AND WORCESTER, J. *Proc. Nat. Acad. Sci., Wash.*, 31, *pp.* 24–34, *Jan.*, 1945.—The law of mass action states that the rate at which an infection passes in a population is proportional to the product of the number of persons who are infectious and the number of persons who are susceptible to the infection. Various modifications of the law are considered and a mathematical analysis of these cases is given. This involves, for the most part, approx. solutions of various differential equations. L. S. G.

541.128 2463

The metal-catalysed reaction between acetylene and hydrogen. II. Further experiments with nickel catalysts. SHERIDAN, J. *J. Chem Soc.*, *pp.* 133–142, *March*, 1945.—[See Abstr. 350 (1945)]. The effect of temperature on the reaction between C_2H_2 and H_2 over a Ni–pumice catalyst was studied in the range 0–126°. Lowering the temperature increases the production of C_2H_4 and (more markedly) C_2H_6; the yield of C_2 hydrocarbons, in terms of the C_2H_2 not recovered, is 31% at 126° and 65% at 0–3° for 1 : 1 gas mixtures. The ratio of the C_2H_2 removed as other products to the H_2 so removed increases as the temp. is raised. Temp. (0–91°) has little influence on the orders of the reactions occurring. With some not improbable assumptions, activation energies, uncorrected for desorption of gas, are deduced as follows: (i) $C_2H_2 + H_2 + Ni \rightarrow C_2H_4 + Ni$: 10·9 kg. cal. at 0–126°. (ii) $C_2H_2 + xH_2 + Ni \rightarrow$ products other than C_2 hydrocarbons + Ni: 14·5 kg. cal. at 0°, falling to 12·7 kg. cal. at 126°. The mechanisms of the reactions are discussed, and it is suggested that reaction (ii) is a surface chain reaction, initiated through a half-hydrogenated state in associatively chemisorbed acetylene.

541.128 2464

The metal-catalysed reaction between acetylene and hydrogen. III. Some effects of added substances on the reaction over nickel. SHERIDAN, J. *J. Chem. Soc.*, *pp.* 301–305, *May*, 1945.—[See Abstr. 2463 (1945)]. Reaction over Ni on a number of carrier substances (chiefly oxides) differs little from that over Ni–pumice. No influence of CO_2 or N_2 is detected. More than *ca.* 3% of NO retards reaction and lowers the yield of C_2H_4 slightly; liquids containing N_2 are formed. Some reduction of NO by H_2 probably occurs. O_2 retards reaction and raises the C_2H_2 yield. It is removed partly as H_2O, but also reacts with the catalyst, its effects persisting during several succeeding experiments. SiO_2, TiO_2, ThO_2, ZnO, Cr_2O_3 catalyse polymerization in C_2H_2 alone at − 200°.

541.128 2465

The metal-catalysed reaction between acetylene and hydrogen. IV. Reaction over platinum. SHERIDAN, J. *J. Chem. Soc.*, *pp.* 305–311, *May*, 1945.—[See Abstr. 2464 (1945)]. C_2H_4 is not formed selectively from C_2H_2 and H_2 over Pt–pumice at 0–163°, though C_2H_2 is more strongly adsorbed than C_2H_4, and at pressures > a value (depending on the pressures of hydrogen and ethylene present) inhibits C_2H_6 production to a rate < that of C_2H_4 formation. With 1 : 1 and 2 : 1 $H_2 : C_2H_2$ mixtures some

6–30% of the C_2H_2 is not recovered, and a comparable amount of H_2, are removed as products less volatile than C_2 hydrocarbons. Previous kinetic data are confirmed and it is shown that lower temperatures favour C_2H_6 production in the early stages. The reactions (i) $C_2H_2 + H_2 = C_2H_4(\rightarrow C_2H_6)$ and (ii) $C_2H_2 + H_2 \rightarrow$ products other than C_2 hydrocarbons are probably both of approx. 1st order with respect to H_2, and have similar heats of activation (that of (ii) being the higher by *ca.* 1–2 kcal.) in the region of 12 kcal. The differences between (i) and (ii) are qualitatively the same as for the corresponding reactions over Ni. The stronger adsorption of C_2H_2 than of C_2H_4 is confirmed by the fact that C_2H_4 added to the system acts primarily as a diluent.

541.128 : 541.127 2466

The catalytic hydrogenation of the benzene nucleus. I. The hydrogenation of phenyl-substituted aliphatic acids. SMITH, H. A., ALDERMAN, D. M., AND NADIG, F. W. **II. The hydrogenation of benzene and mono-alkylbenzenes. III. The hydrogenation of polymethylbenzenes.** SMITH, H. A., AND PENNEKAMP, E. F. H. *J. Amer. Chem. Soc.*, 67, *pp.* 272–281, *Feb.*, 1945.—I. The kinetics of the catalytic hydrogenation of phenyl-substituted acids were studied in AcOH solution, using Adam's Pt catalyst. The reaction rate is first order with respect to *H* pressure, zero order with respect to the concentration of phenyl-substituted acid, and ∝ the amount of catalyst. Factors affecting the rate of catalytic hydrogenation are discussed. II. The relative rates of hydrogenation of mono-alkyl benzenes are compared with those for the series of phenyl-substituted acids, and also with those for a series of C_6H_6 hydrocarbons previously examined. III. Increased Me substitution in polymethylbenzenes decreases the rate of hydrogenation of the nucleus; the position of the substitution also affects the rate, and for compounds with the same number of Me substituents, symmetrically substituted derivatives react most rapidly. W. R. A.

541.128 : 548.74 : 548.73 *see Abstr.* 2592

541.128 : 621.891.2 2467

Factors causing lubricating oil deterioration in engines. Laboratory evaluation. BURK, R. E., HUGHES, E. C., SCOVILL, W. E., AND BARTLESON, J. D. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 302–311, *May*, 1945.—[Abstr. 2288 B (1945)].

541.128.1 : 541.127 *see Abstr.* 2459

541.128.5 2468

The poisoning of nickel hydrogenation catalysts by water vapour. BURFORD, W. B., AND FRAZER, J. C. W. *J. Amer. Chem. Soc.*, 67, *pp.* 331–332, *Feb.*, 1945.—Water vapour acts as a poison in the hydrogenation of C_2H_4 with a Ni catalyst, the effect being noticeable down to 3×10^{-4} mm. pressure of water vapour. The catalyst is reactivated by heating in H_2 to 375°. W. R. A.

541.128.5 2469

The production of a poison for nickel catalysts in the absorption of oxygen by Fieser's solution. BURFORD, W. B., III, AND FRAZER, J. C. W. *J. Amer. Chem. Soc.*, 67, *pp.* 341–342, *Feb.*, 1945.—Fieser's solution No. 2, using an equivalent amount of KOH in place of the NaOH specified, was used to remove oxygen from C_2H_4 in the examination of the poisoning of Ni hydrogenation catalysts by water vapour. Highly erratic results were obtained due to the introduction of CS_2 into the C_2H_4. The concentration of oxygen does not govern the amount of CS_2 formed, and C_2H_4 alone is without effect. W. R. A.

541.132 2470

The diffusion of ions in supporting electrolytes. DEAN, R. B. *J. Amer. Chem. Soc.*, 66, *pp.* 31–35, *Jan.*, 1945.—A supporting electrolyte is defined as the electrolyte (or mixture of electrolytes) initially present at uniform conc. throughout a system in which diffusion takes place. An equation is developed relating the integral diffusion coefficient of any ion to the conductivities of the supporting and diffusing electrolytes. The diffusion of chloride, Cu and citrate ions has been measured in various supporting electrolytes and the results agree with theory. The diffusion of ions is nearly independent of the relative ionic mobilities of the supporting electrolyte but depends almost entirely on the conductivity of the latter. When the supporting electrolyte has 10 times the conductivity of the diffusing electrolyte, an ion diffuses at a rate that still differs from its ideal rate, if uncharged, by 5% of the difference between the ideal rate and the rate in the absence of supporting electrolyte. For larger conductivity ratios the deviation will be proportionately less.

541.132 2471

The temperature dependence of ionic dissociations. JENKINS, H. O. *Trans. Faraday Soc.*, 41, *pp.* 138–140, *March*, 1945.—The experimental data for the electrolytic dissociation of many weak acids in water and dioxane-water mixtures were subjected to a theoretical analysis, using the equation

$$\log K = A/T + B \log T/T + C \log^2 T/T + D.$$

This equation is satisfactory. Agreement with other equations was found for $\Delta H°$, $\Delta G°$ and $\Delta S°$, but not for ΔC_P. A similar type of curve is given when $\Delta S°$, $\Delta H°$ and ΔC_P are plotted against the reciprocal of the permittivity of the medium.

541.132 2472

The extension of dissociation of salts in water. X. Dissociation minima. DAVIES, C. W. *J. Chem. Soc.*, *pp.* 460–464, *July*, 1945.—In solutions in which the ionic strength increases sufficiently rapidly with increasing conc., ion-association will increase up to a critical conc., and thereafter will decrease. The degree of dissociation of the electrolyte will therefore have a minimum value. Evidence for this is found amongst aqueous solutions containing multivalent ions, and it is suggested that the effect will have an important bearing on the properties of colloid systems and non-aqueous solutions.

541.132 : 532.74 : 537.311 *see Abstr.* 2300

541.132 : 535.243 *see Abstr.* 2224

541.132 : 666.1 2473

Energy additivity in glasses. HUGGINS, M. L., AND SUN, K.-H. *J. Soc. Glass Technol.*, 28, *pp.* 463–468, *Dec.*, 1944.—Energies of dissociation into the component ions were computed for simple and complex oxides. From these, 51 energy constants are obtained, which may be used to compute approximate ionic

ssociation energies in crystals and glasses in which ch metallic atom is surrounded by oxygens. The lation of these constants to the Periodic Table is own and briefly discussed. Slight deviations from ddítivity in silicates and phosphates are related to the pendence of the energy on the number of oxygens in O_4 and PO_4 groups which are shared with other Si P atoms.

41.132.3 2474

pH of aqueous mixtures of potassium dihydrogen osphate and disodium hydrogen phosphate at 0° to 0°C. BATES, R. G., AND ACREE, S. F. *J. Res. Nat. ur. Stand., Wash.*, 34, *pp.* 373–394, *April*, 1945.—. method is suggested for computing the *p*H of osphate buffers from e.m.f. measurements of cells ithout liquid junction. Each of the 33 buffer lutions studied was prepared from equal molal uantities. The solutions were divided into 5 series ith respect to the amount of NaCl added. The tios of the molality of each buffer salt to that of aCl in the 5 series were about 1, 2, 3, 8, and 10. he *p*H values were computed from measurements of lls with H electrodes and Ag–AgCl electrodes by a rocedure that involves extrapolation of a function f the e.m.f. to zero concentration of NaCl. The alues of the second dissociation constant of H_3PO_4 Abstr. 1216 (1943)] were confirmed. The mean alues of *p*K, the negative of the common log of the cond dissociation constant, are given as a function f abs. temperature, *T*, by the equation

$$pK = 2\,073{\cdot}0/T - 5{\cdot}9884 + 0{\cdot}020912T$$

etween $T = 273{\cdot}16$ and $T = 323{\cdot}16$ (0° to 50°C.). quations are given to express the change of *p*H ith molality of NaCl. The *p*H values from 0° to 0°C. of 8 phosphate buffers without chloride are sted. The densities of the buffers were determined.

41.132.3 2475

Comparative liquid-junction potentials of some *p*H uffer standards and the calibration of *p*H meters. ANOV, G. G., DELOLLIS, N. J., AND ACREE, S. F. . *Res. Nat. Bur. Stand., Wash.*, 34, *pp.* 115–128, eb., 1945.—By application of the equation $pH = (E - E_{ref} - E_j/k)$ to solutions whose *p*H values ere known accurately, the sum of the poten- ials of the reference electrode and of the liquid- nction potential $E_{ref} + E_j$, was obtained at 25°C. y the method of cells with liquid junction for 7 olutions suitable for standards of *p*H. Ag–AgCl lectrodes immersed in saturated KCl solution were sed. As E_{ref} remains constant when the buffer is hanged, values for the differences in the liquid- nction potentials of various buffers in contact with aturated KCl solution were obtained from the data. hese differences were then used to calibrate 7 ype 015 and 3 low-alkali-error glass electrodes of ommercial manufacture. The average agreement etween the true *p*H of the buffer-chloride solution letermined from cells without liquid junctions) and at read on various commercial *p*H meters when orrected for the difference in the liquid-junction otentials and the alkali error of the electrode was ±0·01 *p*H unit. The data also furnish a critical test f the consistency of the *p*H values assigned to the arious buffer solutions recommended for the alibration of the *p*H scale and for checking *p*H meters.

541.132.3 : 620.193.92 2476

Effect of aeration on hydrogen-ion concentration of soils in relation to identification of corrosive soils. ROMANOFF, M. *J. Res. Nat. Bur. Stand., Wash.*, 34, *pp.* 227–242, *March*, 1945.—62 air-dried soil samples taken from the N.B.S. soil-corrosion test sites were saturated and stored without air for almost 1 year. Significant changes in *p*H were observed in the majority of the samples and large changes in many of them. For the identification of areas corrosive to iron and steel, *p*H measurements of soils should be made on samples maintained in the natural field condition.

541.132.3 : 663.63 2477

Purification of water by use of synthetic ion-exchange resins: Using *p*H as a control. KENWORTHY, A. L., AND HOWARD, J. N. *Soil Sci.*, 57, *pp.* 293–294, *April*, 1944.—H_2O purified by synthetic ion-exchange resins (e.g. Amberlite) compares favourably with H_2O obtained from a copper still; the deionized H_2O is comparable to redistd. H_2O. Conductivity determinations clearly indicate that an ordinary *p*H meter may be used in the detection of the break-through point of the resins. The meter may also be used to regulate the regeneration and washing process after each cycle. Using conductivity determinations as a measure of purity the rate of the water flow through the resins had little effect on the purity of the deionized H_2O. Germination of the sporangia of *Phytophthora infestans* indicated a continued adsorption of Cu after the cation exchanger is saturated. C. J. G.

541.134 2478

Hydrogen over-voltage in concentrated sulphuric and phosphoric acid solutions. DE BÉTHUNE, A. J., AND KIMBALL, G. E. *J. Chem. Phys.*, 13, *pp.* 53–63, *Feb.*, 1945.—The over-voltage for the discharge of H on a Hg cathode has been measured at 25°C. in H_2SO_4 solutions in the range 0·125 to 9·65 *M*. In dilute solution, the over-voltage is independent of the acid conc., the cathode reaction being the discharge of a proton from water. At conc. > 2·83 *M*, the over-voltage decreases approximately as a linear function of the weight percentage. In this region the cathode reaction involves the H_2SO_4 molecule. Preliminary results on H_3PO_4 solutions also show a drop in the over-voltage as the concentration is increased beyond 1 *M*.

541.135 2479

Periodic phenomena at anodes. BARTLETT, J. H. *Phys. Rev.*, 67, *p.* 268, *April* 1 *and* 15, 1945.—If a storage battery is connected through a resistance *R* to an electrolytic cell, an electric current may be made to flow through the cell. For a certain range of values of *R* and of the voltage across the cell, the current may oscillate continually and it may show a well-defined period.

541.135.2 : 541.124.7 2480

The kinetics of the electro-deposition of the azide ion. STOUT, H. P. *Trans. Faraday Soc.*, 41, *pp.* 64–75, *Feb.*, 1945.—The anodic deposition of the azide ion from aq. solution at Pt, Pd, and Ir electrodes is an irreversible process giving a linear $V/\log i$ curve with α approx. = 1. The reaction is $N_3^- = 3/2\,N_2 + e^-$, and the reversible potential for unit activity of N_3^- is estimated to be −3·3 V against a normal H

electrode. Deposition occurs at measurable rates only at the high overpotential of 4 V. Increase in temperature causes a small but significant increase in α, and the energy of activation is about 12 kcal/mole at a potential of 0·81 V against saturated calomel. The rate of reaction at a given potential varies with electrode metal, and with conc. of solution, but is independent of *p*H up to 9·4. At higher *p*H's, O_2 is preferentially evolved.

541.135.5 2481

A microcalomel electrode for polarographic measurements. WEST, P. W., AND AMIS, E. S. *Science*, 101, *pp.* 71–72, *Jan.* 19, 1945.

541.135.5 2482

Membrane equilibria which involve only the ions of strong inorganic electrolytes. SOLLNER, K., AND GREGOR, H. P. *J. Amer. Chem. Soc.*, 67, *p.* 346, *Feb.*, 1945.—The use of recently developed collodion and protamine collodion membranes for the experimental study of Donnan membrane equilibria involving strong inorganic electrolytes is discussed. These membranes combine extreme ionic selectivity with great permeability for the non-restricted ion species. The ionic screening action of the membranes is primarily an electric and not a mechanical effect. Experimental results for K^+, Na^+ and NH_4^+ salts are given. W. R. A.

541.135.5 : 545.372 *see Abstr.* 2543

541.135.6 2483

The anodic behaviour of metals. I. Platinum. HICKLING, A. *Trans. Faraday Soc.*, 41, *pp.* 333–339, *June*, 1945.—The initial build-up of anodic polarization at a smooth Pt anode over a wide range of conditions was investigated by an oscillographic method. The experimental results of previous workers are confirmed and extended, and 3 main stages in the polarization are distinguished corresponding to the ionization of H, the charging of a double layer, and the deposition of O at the electrode; it is suggested that the last process corresponds to the formation of a unimolecular layer of platinous oxide on the electrode surface. Attention is drawn to a singular anomaly which occurs in the presence of halides, when the anode potential rises directly to that for halogen evolution even where this is higher than the value at which oxygen can normally begin to deposit on the anode surface.

541.138 2484

Effect of substituents on the oxidation potential of ferrous *ortho*-phenanthroline complexes. EWENS, R. V. G. *Nature, Lond.*, 155, *p.* 398, *March* 31, 1945.

541.14 : 545.8 2485

Photochemical analysis. Estimation of ferric salts. RAO, G. G., AND RAO, V. M. *Curr. Sci.*, 13, *pp.* 317–318, *Dec.*, 1944.

541.141 : 77.01 2486

Quantum theory of exposure tested extensively on photographic emulsions. SILBERSTEIN, L., AND TRIVELLI, A. P. H. *J. Opt. Soc. Amer.*, 35, *pp.* 93–107, *Feb.*, 1945.—Earlier [see Abstr. 298 (1943)] a formula was derived from the quantum theory of exposure for the characteristic curves of photographic emulsions. A detailed analysis has now been made of 6/700 curves for a great variety of emulsions under widely different development conditions. It is found that the measured densities, D, for the total range of exposures applied, can be very closely represented either by a single or by two strictly quantic terms, that is to say functions of the exposure derived rigorously from the quantum theory under the assumption of a simple schematic form of size-frequency distribution in the emulsion. A. H.

541.141.12 : 532.13 2487

Effect of ultra-violet light on cellulose acetate and nitrate. LAWTON, T. S., JR., AND NASON, H. K. *Industr. Engng Chem.*, 36, *pp.* 1128–1130, *Dec.*, 1944.—The effect on the viscosity of cellulose acetate and nitrate was studied in atmospheres of air, N_2, and O_2. In air and O_2 the degradation of these esters is accelerated. The effect of a N_2 atmosphere is to retard degradation. In all atmospheres the drop in viscosity for cellulose acetate was gradual; for cellulose nitrate the viscosity dropped more rapidly during the initial part of exposure and then levelled off.

541.144.7 : 541.124/.127 2488

Inadequacies in present knowledge of the relation between photosynthesis and the O^{18} content of atmospheric oxygen. KAMEN, M. D., AND BARKER, H. A. *Proc. Nat. Acad. Sci., Wash.*, 31, *pp.* 8–15, *Jan.*, 1945.

541.144.7 : 541.124.7 : 541.57 2489

Bromination of hydrocarbons. I. Photochemical and thermal bromination of methane and methyl bromine. Carbon–hydrogen bond strength in methane. KISTIAKOWSKY, G. B., AND VAN ARTSDALEN, E. R. *J. Chem. Phys.*, 12, *pp.* 469–483, *Dec.*, 1944.—The bromination of CH_4 was studied in the range 423–503°K., using a photo-electric photometer. A chain mechanism was found. Bromination of CH_3Br is analogous but from 7·5 to 10 times more rapid in this temp. range. Thermal bromination, studied at 570°K., followed the same mechanism as photochemical reaction, except that Br atoms are produced thermally. The activation energy of photochemical bromination of CH_4 is 17·8 kcal/mole and that of CH_3Br is 15·6 kcal/mole. Varying efficiencies of different molecules as third bodies in the homogeneous recombination of Br atoms are discussed. Configurations of activated complexes are assigned and shown to be reasonable by statistical mechanical calculations. Activation energies and other data give a value for the C–H bond strength in CH_4 of 102 kcal/mole at room temperature.

541.144.7 : 581.036 2490

Effect of temperature on photosynthesis and respiration in red and loblolly pines. DECKER, J. P. *Plant Physiol.*, 19, *pp.* 679–688, *Oct.*, 1944.—Expts. were undertaken to discover whether the ratio, R, of photosynthesis to respiration in red pine is affected by high temp. and to account for the retarded growth of red pine in a forest in North Carolina. The rates of apparent photosynthesis and respiration were measured in seedlings of red and loblolly pine at 20, 30 and 40°C., light intensity of 4 500 ft. candles being used. The values for the two species were approx. the same at 30° as at 20°C. but decreased about 45% when the temp. was increased from 30° to 40°C. The value of R for both species was approx. 13 at 20°, 6·8 at 30°, and 3 at 40°C. Supplementary measurements of photosynthesis at a light intensity of 9 300 ft. candles and temps. of 19° and 32°C.

showed no significant difference in the behaviour of the two species. *R* showed the same proportional decrease with increase in temp. in both species. There was no indication of a gross disturbance of the photosynthetic-respiratory balance of red pine at high temp. that might explain its retarded growth south of its normal range. The apparatus comprised two shoot chambers, a light source, three air sampling and analysis units and a flow-meter and valve for regulating the air-flow through the shoot chambers. The electrical components are a centrifugal fan, a heater, a thermo-regulated controller, and an electric blower which assured a continuous supply of air of nearly constant CO_2 content. C. J. G.

541.145 : 541.124 : 541.64 2491

The mercury-photosensitized polymerization and hydrogenation of butadiene. GUNNING, H. E., AND STEACIE, E. W. R. *J. Chem. Phys.*, 12, *pp.* 484–493, *Dec.*, 1944.—Collisions of butadiene mols. with $Hg(^3P_1)$ atoms result in the formation of activated mols. of relatively long life, and these are mainly used up by the following reactions: (i) $C_4H_6^* \rightarrow C_4H_4+H_2$; (ii) $C_4H_6^*+C_4H_6 \rightarrow 2C_4H_6$; (iii) $C_4H_6^* + C_4H_6 \rightarrow (C_4H_6)_2$. H atoms are formed when the H formed by (i) reaches a high enough conc. in the system to quench the $Hg(^3P_2)$ atoms appreciably; polymerization then occurs by the reactions $C_4H_6 + H \rightarrow C_4H_7$, and $C_4H_6 + C_4H_7 \rightarrow C_8H_{13}$ etc. N. M. B.

541.145 : 541.124.7 2492

The chain photolysis of acetaldehyde in intermittent light. HADEN, W. L., JR., AND RICE, O. K. *J. Chem. Phys.*, 12, *p.* 521, *Dec.*, 1944.—Erratum [see Abstr. 2922 (1942)].

541.18 : 537.228.3 2493

Electro-optical properties of colloids. II. SAKMANN, B. W. *J. Opt. Soc. Amer.*, 35, *pp.* 66–85, *Jan.*, 1945.—Investigations of the electric birefringence of colloidal solutions (monodisperse bentonite sols) in alternating fields show that, in general, the double refraction consists of a direct and an alternating part, both depending on field strength and frequency of the applied field, particle size, temp., and conc. of the solution. The direct birefringence, which can be positive or negative, can reverse its sign with a change of any of the 5 parameters mentioned. The measurements are interpreted by a relaxation theory which can satisfactorily explain all phenomena connected with the vibrating component, and the variations and the reversal of the direct birefringence with changes of the frequency, field strength, particle size, and temp. The changes and reversal of sign of the direct component with conc. are accounted for by assuming that the micelles are surrounded by a compressed water hull, the pressure of which depends on particle size and conc. Direct and alternating birefringence have different relaxation times [see Abstr. 2924 (1942)]. N. M. B.

541.18.041 2494

Accuracy of mineral frequency analysis of sediments. ALLEN, P., AND WALDER, P. S. *Nature, Lond.*, 155, *pp.* 173–174, *Feb.* 10, 1945.

541.18.043 2495

A centrifuge tube agitator. REITEMEIER, R. F. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *p.* 267, *April*, 1945.

541.18.05 2496

A simple, rapid technique of preparing water-in-oil emulsions of penicillin, drugs and biologics. FREUND, J., AND THOMSON, K. J. *Science*, 101, *pp.* 468–469, *May* 4, 1945.

541.182.021 2497

Electron microscopic investigation of precipitates of cellulose nitrates. HAMBRAEUS, G., AND RÅNBY, B. *Nature, Lond.*, 155, *pp.* 200–201, *Feb.* 17, 1945.

541.182.025 : 537.226.2 2498

Thixotropy and dielectric constant of printing inks. PARTS, A. *Nature, Lond.*, 155, *pp.* 236–237, *Feb.* 24, 1945.

541.182.5 2499

Gel-forming derivative of wheat gluten. REITZ, H. C., FERREL, R. E., AND OLCOTT, H. S. *Industr. Engng Chem.*, 36, *pp.* 1149–1151, *Dec.*, 1944.—A product obtained from wheat gluten by the action of chlorosulphonic acid and pyridine or cold conc. H_2SO_4 possesses, after neutralization, the property of absorbing rapidly 100–300 times its weight of cold water to form a firm, odourless, tasteless, and non-toxic gel.

541.182.5 : 542.952.6 *see Abstr.* 2534

541.182.6 : 532.133 *see Abstr.* 2174

541.182.6 : 537.362 2500

Comparison of the properties of freshly precipitated and heated aluminosilicates and alumina and silica gels and of clay minerals. RAYCHAUDHURI, S. P., AND DATTA, N. B. *J. Phys. Chem.*, 49, *pp.* 21–31, *Jan.*, 1945.—Nine kinds of aluminosilicate gels were prepared by mixing different proportions of SiO_2 and $Al(OH)_3$ sols ($SiO_2 : Al_2O_3$ ratios = 2 : 1, 3 : 1, and 4 : 1), (1) by slowly adding $Al(OH)_3$ sol to an excess of SiO_2 sol; (2) by mixing the two sols dropwise. The chemical composition ($SiO_2 : Al_2O_3$ ratios), electro-osmotic charge, base-combining capacities, moisture contents at 50% r.h., and buffer curves were determined. These experiments were carried out also with electrodialysed alumina and silica gels and with the minerals montmorillonite, halloysite, kaolin, quartz, and bauxite. All these substances were subsequently heated in a steam autoclave for 12 hr. at 1 atm. pressure, and the physicochemical and electrical properties of the heated substances were determined. On heating, the precipitated aluminosilicates tend to acquire the properties of naturally occurring aluminosilicates. Mixing the colloidal solutions dropwise favours the formation of mineral structures.

541.182.6 : 539.26 *see Abstr.* 2392

541.182.6.046 : 532.71 2501

Note on the relationship between time of dialysis and the Burton–Bishop rule. TULLER, E. F., AND EBLIN, L. P. *J. Phys. Chem.*, 41, *p.* 9, *Jan.*, 1945.—Using NaCl and Na_2SO_4 as coagulating electrolytes, it is found that those sols which have been dialysed until they are chloride-free conform to the Burton–Bishop rule [*ibid.*, 24, p. 701, 1920]. Sols may conform to the rule before they have become chloride-free, and all sols exhibiting this unexpected combination of properties had been dialysed for 96 hr.

541.183.1 2502

The effect of the sub-phase upon the properties of physically adsorbed films. JURA, G., AND HARKINS,

W. D. *Proc. Amer. Phys. Soc., Chicago, Dec.* 1 *and* 2, 1944. *Abstr. in Phys. Rev.*, 67, *p.* 61, *Jan.* 1 *and* 15, 1945.—When the effective cross-sectional area of N_2 on 100 solids is calculated, it is found that 3 max. are obtained at 14·0, 15·2, and 16·2 Å^2. In some cases there is a relation between the area exhibited and the composition or the crystal structure of the solid. The film of propyl alcohol on $BaSO_4$ is monomolecular, but polymolecular on anatase (TiO_2) and quartz. The thickness of the film is related to the lattice constants of the solids. The transition from a gaseous to an intermediate film is first-order at 1 000 Å^2 per molecule for one solid while for another of the same crystal structure and particle size, the transition is second-order at 50 Å^2 per molecule.

541.183.1 2503

A theory of adsorption towers. BRIANT, R. C. *Bull. Univ. Pittsburgh*, 41, 4, *pp.* 38–47, 1945.—A mathematical treatment on the assumption that the fluid flowing through the tower has a definite unique value at each point and that this velocity is constant or changes slowly with time. Complications not directly of interest in tower operation are avoided; turbulence, flow irregularities, and the pressure drop in the tower due to flow are ignored. An equation is derived, suitable approximations are introduced, deductions of operational constants are shown, and applications to representative data are plotted and discussed.

N. M. B.

541.183.3 2504

Multiple adsorption from solutions. WALTER, J. E. *J. Chem. Phys.*, 13, *pp.* 229–234, *June*, 1945.—The general theory of the adsorption of solutes from solutions treated by a process similar to that used in chromatography is given. By assuming a chemical equilibrium between adsorbed material and the solution, the adsorption equations can be solved explicitly. A detailed discussion of the 2-component problem is given; the many-component problem and the extension of the theory to more general adsorption isotherms are considered.

541.183.526 2505

The sorption of hydrogen by poisoned copper. Temperature variation experiments. GRIFFIN, C. W. *J. Amer. Chem. Soc.*, 67, *pp.* 62–64, *Jan.*, 1945.—The sorption of H_2 with temperature variation on pure massive Cu was determined and compared with that of H_2 on the same Cu poisoned with a small quantity of CO. The effect of the poison is to prevent the solution of H_2 in Cu.

541.24 2506

Molecular weight of Palmer's β-lactoglobulin. GUTFREUND, H. *Nature, Lond.*, 155, *p.* 237, *Feb.* 24, 1945.—[See Abstr. 1868 (1944)].

541.24 : 535.435 2507

An investigation of the determination of molecular weights of high polymers by light scattering. DOTY, P. M., ZIMM, B. H., AND MARK, H. *J. Chem. Phys.*, 13, *pp.* 159–166, *May*, 1945.—The determination of the molecular wts. of large molecules by measuring the turbidity of the solution and the change in refractive index with concentration is discussed. The apparatus, its calibration, and the technique used are described, with a comparison between molecular wts. measured by this and other methods. The effect of polymolecularity is also presented.

541.265 2508

The effect of temperature on molecular parachors. GARDNER, T. S., SAMUEL, R. *J. Chem. Phys.*, 13, *p.* 251, *June*, 1945.

541.265 : 535.324 2509

A study of organic parachors. VIII. A supplementary series of tertiary chlorides. SMART, K. O., AND QUAYLE, O. R. *J. Amer. Chem. Soc.*, 67, *pp.* 21–23, *Jan.*, 1945.—The refractive indices, densities, surface tensions and parachors for 9 supplementary tertiary chlorides are reported, at 3 temperatures. The predicted and experimental values of the parachors are in close agreement. A table is given for use in calculating the parachor of any tertiary chloride having normal alkyl groups.

541.42 : 632.94 2510

The stability of derris in insecticidal dusts. The solvent-powder effect. CAHN, R. S., PHIPERS, R. F., AND BRODATY, E. *J. Soc. Chem. Ind.*, 64, *pp.* 33–40, *Feb.*, 1945.—Oxidation of powders containing rotenone is greatly accelerated by addition of minor amounts of inert non-volatile liquid. Major factors controlling the rate of oxidation are the form and nature of the rotenone-containing material, the natures of the added liquid and of the solid phase, the amounts of rotenone-containing extract and added liquid and the ratios thereof, and the temperature. Oxidation is greatly decelerated by small amounts of strong acids, but is never totally suppressed; the amount of acid required for max. stability varies according to the nature of the preparation. The solvent-powder effect is held to be due to distribution of a solution of the extract over a large surface area. Stabilization by acid is believed to be due to the stability of derris, etc., increasing from alkalinity through neutrality to acidity; in neutral preparations oxidation, generally imperceptible in purely solid preparations or in bulk solutions, becomes important when accelerated by distribution of a solution over a large surface area. The phenomena are investigated by means of quantitative colour tests with particular reference to (i) the anti-louse powder, A.L. 63, Marks I and II, of the British Armed Forces, and (ii) the "conditioned dusts" of American agriculture. For these uses stabilization by acid has great practical value.

541.43.05 2511

Target chemistry of zirconium and yttrium; isolation of Zr^{89} in pure state. KURBATOV, M. H., AND KURBATOV, J. D. *J. Chem. Phys.*, 13, *pp.* 208–216, *June*, 1945.—Radioactive Zr^{89} obtained by bombardment of Y_2O_3 with deuterons, was separated without addition of stable Zr in quantities $\simeq 10^{-10}$ gram. Oxychloride solutions of Zr^{89} mixed with inactive Zr were used for coagulation studies in the conc. range $1{\cdot}5\times10^{-4}$–$1{\cdot}5\times10^{-11}$ g.atom/l. It was found that the fraction coagulated increased with dilution under the const. conditions used (*p*H, 4·0; NaCl, $2{\cdot}5\times10^{-2}$ *N*; *T*, 25°C), to $2{\cdot}7\times10^{-6}$ g.atom/l. The log-log plot of Zr conc. (*C*) in solution against coagulated part (*c*) closely approaches a straight line with exponent $n = 1{\cdot}50$ and $k = 490$. At $1{\cdot}5\times10^{-6}$ g.atom/l. and lower concs. the coagulated fraction reaches a max. and becomes const., $k = C/c = 0{\cdot}45$.

Within the range studied salt increases coagulation of Zr above 10^{-5} g.atom/l.; but below 10^{-6} g.atom/l. the salt effect is reversed. Increase in *p*H results in increase in the fraction coagulated (*r*) in all concs. studied. At a minute conc. $r = (p\mathrm{H} - K)/m$, K being 1·85 with 0·05 *N* NaCl, and 1·58 with 0·005 *N* NaCl, and m being 3·15. The separation of Zr^{89} in minute quantities without addition of stable Zr is plausible if a Nernst distribution of Zr between coagulated part and solution is postulated.

541.454 : 541.63 *see Abstr.* 2520

541.454 : 541.636 *see Abstr.* 2522

541.5 2512

Molecular constants and chemical theories. WHELAND, G. W. *J. Chem. Phys.*, 13, *pp.* 239–249, *June*, 1945.—Topics from four papers by Samuel on the theory of valence are critically examined. Conclusions are that Samuel's bond-moments for molecules containing "pentacovalent N" are not as satisfactory as claimed, and provide no evidence in favour of the existence of pentacovalent N; that Samuel's eigenfunctions for structures with pentacovalent N are identical with the ones set up in the now conventional manner for structures without pentacovalent N but with semipolar double bonds instead; that the existence of antibonding orbitals seems to be theoretically necessary; and that several of Samuel's further conclusions are either based upon the use of words in unfamiliar senses, or else are erroneous.

541.5 : 541.6 2513

Structure of boron hydrides. BURAWOY, A., BELL, R. P., AND LONGUET-HIGGINS, H. C. *Nature, Lond.*, 155, *pp.* 328–329, *March* 17, 1945.

541.57 : 536.66 : 541.127 *see Abstr.* 2460

541.57 : 539.133 2514

Bond moments of higher valence states. SAMUEL, R. *J. Chem. Phys.*, 12, *pp.* 521–522, *Dec.*, 1944.—In a previous paper additive bond moments were calculated for non-aromatic first-order molecules formed by a central atom in its maximal state of valency [see Abstr. 372 (1945)]. Whether the new values were really those of the semipolar double bonds remained doubtful; it is shown that this is not the case.

541.57 : 539.133 2515

Donor-acceptor bonding. III. Methyl cyanide addition compounds of boron trichloride and boron trifluoride. LAUBENGAYER, A. W., AND SEARS, D. S. *J. Amer. Chem. Soc.*, 67, *pp.* 164–167, *Feb.*, 1945.—V.d. measurements on $CH_3CN : BCl_3$ and $CH_3CN : BF_3$ show that dissociation of these compounds in the vapour phase is complete. Values of the heats of dissociation of $CH_3CN : BCl_3(s)$ and $CH_3CN : BF_3(s)$ are 33·4 and 26·5 kcal. respectively as calculated from these measurements; the calorimetrically determined heats of formation of $CH_3CN : BCl_3(s)$ and $CH_3CN : BF_3(s)$ from the gaseous components are 33·8 and 26·5 kcal. Cryoscopic measurements in C_6H_6 show that in dilute solutions $CH_3CN : BF_3$ is not appreciably dissociated. The dipole moment of $CH_3CN : BF_3$ is approximately 5·8 debyes. W. R. A.

541.57 : 539.133 *see Abstr.* 2366

541.57 : 541.124.7 : 541.144.7 *see Abstr.* 2489

541.6 2516

On the structure of dimethyl ether-boron trifluoride. BAUER, S. H., FINLAY, G. R., AND LAUBENGAYER, A. W. *J. Amer. Chem. Soc.*, 67, *pp.* 339–341, *Feb.*, 1945.—Data previous obtained [Abstr. 2258 (1943)] are re-discussed. Assuming the dissociation of the $(CH_3)_2O : BF_3$ complex at 40°C, previously considered negligible, to be about 50%, the structure in best agreement with the electron diffraction data has B–F = 1·43 ± 0·03 Å, B–O = 1·50 ± 0·06 Å, C–O = 1·45 ± 0·03 Å. Electron diffraction examination of the CH_3CN–BCl_3 complex showed it to be completely dissociated at 95°. W. R. A.

541.6 2517

The carbonato and bicarbonato pentammine cobalti ions. LAMB, A. B., AND MYSELS, K. J. *J. Amer. Chem. Soc.*, 67, *pp.* 468–480, *March*, 1945.—The lack of structural significance of the water content of crystals of carbonato pentammine cobalti nitrate is shown. The dissociation constant of the bicarbonato pentammine cobalti ion is calculated from *p*H measurements on solutions containing mixtures of the bicarbonato and carbonato pentammine ions and their aquation products at 25°C, and of similar unaquated mixtures at 0°C. The values indicate a dipolar cationic structure for the carbonato pentammine cobalti ion and analogous ammines. The velocity constant for the aquation of the bicarbonato pentammine cobalti ion has been determined at 0°C and 25°C, and the equilibrium constant for the aquation of this ion calculated at 25°C. The carbonato pentammine cobalti ion appears to undergo a slow direct aquation. W. R. A.

541.6 : 541.5 *see Abstr.* 2513

541.6 : 662.75 : 621.43.019 2518

The effect of the molecular structure of fuels on the power and efficiency of internal combustion engines. KETTERING, C. F. *Industr. Engng Chem.*, 36, *pp.* 1079–1085, *Dec.*, 1944.—A lecture summary of the knock characteristics of fuels of various structures, expressed and plotted in terms of aniline equivalents. Long thin mols. knock badly and short compact ones of the same wt. only a little; the difference between them may amount to several-fold changes in the potential power output of an engine using them. The production and test of the efficient fuel "triptane" (2,2,3-trimethylbutane) is discussed in relation to engine design, and performance curves are given. N. M. B.

541.612 2519

Distribution of chain lengths and compositions in copolymers. STOCKMAYER, W. H. *J. Chem. Phys.*, 13, *pp.* 199–207, *June*, 1945.—The instantaneous distribution of chain compositions and chain lengths in vinyl copolymers is obtained in a simple form valid for long chains. The compositions of chains of a given length are normally distributed about the mean value, with a standard deviation which can be calculated from experimentally observable quantities. The distribution of chain lengths intimately resembles that for simple polymers.

541.63 : 541.454 2520

Studies in stereochemistry. V. The effect of *F*-strain on the relative base strengths of ammonia and trimethylamine. VI. The effect of *F*-strain on the relative base strengths of ammonia and the methylamines. BROWN, H. C. *J. Amer. Chem. Soc.*, 67, *pp.* 374–380,

March, 1945.—V.—The relative base strength of NH_3 and NMe_3 has been determined with Me_3B, Et_3B, $(iso\text{-}Pr)_3B$ and $(tert\text{-}Bu)_3B$ as the reference acids. The order $NH_3 < NMe_3$ observed with H acids and with Me_3B is reversed with the other B acids as predicted from the effect of *F*-strain [Abstr. 1846 (1944)]. Improved methods for the preparation of Me_3B and Et_3B are described. The saturation pressures for the addition compounds of Et_3B, $(iso\text{-}Pr)_3B$ and $(tert\text{-}Bu)_3B$ with NH_3 and NMe_3 are determined. VI.—The order of base strength $NH_3 < Me_3N < MeHN_2 < Me_2NH$ observed with H acids and with Me_3B is changed to $Me_3N < Me_2NH < NH_3 < MeNH_3$ with $(tert\text{-}Bu)_3B$ as the reference acid, as predicted from the increased *F*-strain. The preparation of $MeNH_2 . (tert\text{-}Bu)_3B$ and $Me_2NH . (tert\text{-}Bu)_3B$ are described. W. R. A.

541.634 2521

Contributions to the stereochemistry of γ-carotene. ZECHMEISTER, L., AND POLGÁR, A. *J. Amer. Chem. Soc.*, 67, *pp.* 108–112, *Jan.*, 1945.—The *cis-trans* isomerization of γ-carotene, $C_{44}H_{56}$ (from *Mimulus* and *Gazania* flowers, lower melting form) was studied by several methods. Some stereoisomers are tentatively assigned configurations.

541.636 : 541.454 2522

***B*-strain and base strength.** BROWN, H. C. *J. Amer. Chem. Soc.*, 67, *p.* 503, *March*, 1945.—The C–P–C bond angle in Me_3P is $100 \pm 4°$ and *B*-strain is therefore absent [Abstr. 1846 (1944)]. The order of base strength should be $PH_3 < MePH_2 < Me_2PH < Me_3P$; published data show the order to be $PH_3 < MePH_2 <$ (Me_2PH and Me_3P). Saturation pressures at 25°C and 75°C for $Me_2PH . HCl$ and $Me_3P . HCl$, as well as a competition experiment with a mixture of Me_2PH, Me_3P and HCl, give the order of strength $Me_2PH < Me_3P$. This is taken as strong support for the *B*-strain hypothesis. W. R. A.

541.64 : 53 2523

Division of High-polymer Physics of the American Physical Society. *J. Chem. Phys.*, 13, *pp.* 1–2, *Jan.*, 1945.—List of papers presented at the inaugural meeting, on June 23–24, 1944.

541.64 : 539.42 2524

Polymolecularity and mechanical properties of cellulose acetate. SOOKNE, A. M., AND HARRIS, M. *J. Res. Nat. Bur. Stand., Wash.*, 34, *pp.* 467–476, *May*, 1945.—The tensile strengths, ultimate elongations, and folding endurances of films prepared from a series of cellulose acetate fractions and blends were studied. When the mechanical properties are plotted against the intrinsic viscosities (or relative weight-average degrees of polymerization), the results for the fractions and different blends fall on separate curves. In contrast, when the mechanical properties are plotted against the number-average degrees of polymerization, the results for the fractions and all of the blends fall approximately on a single curve for each property. The results are qualitatively consistent with the hypothesis that the mechanical properties of blends are the weight-averages of the properties of their components. The results emphasize the importance of the determinations of the number-average degree of polymerization in studying commercial polymolecular materials.

541.64 : 541.124 : 541.145 *see Abstr.* 2491

541.65 : 537.533.73 *see Abstr.* 2318

541.66 2525

The acidic constituents of Degras. A new method of structure elucidation. WEITKAMP, A. W. *J. Amer. Chem. Soc.*, 67, *pp.* 447–454, *March*, 1945.—A new method of structure elucidation applicable to acids or amides with simple branched chains based on the number of transitions appearing in the solidification point curves of binary mixtures of the branched acid or amide with normal fatty acids or amides, is described.

541.68 : 532.72 : 532.13 *see Abstr.* 2168

542.23 2526

A magnetic stirrer for continuous gas-flow apparatus. WINOKUR, M. *Science*, 101, *pp.* 49–50, *Jan.* 12, 1945.

542.231 : 542.74 2527

A combination gas-delivery tube and stirrer. RUSSELL, R. R., AND VANDERWERF, C. A. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *p.* 269, *April*, 1945.

542.231.7 2528

A chuck for glass tubing. SOMERVILLE, J. M. *J. Sci. Instrum.*, 22, *pp.* 114–115, *June*, 1945.

542.4 : 533.52 *see Abstr.* 2195

542.48 2529

Determination of total nitrogen in proteins and their hydrolyzates. Improved method and apparatus. JONNARD, R. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 246–249, *April*, 1945.—A modified Kjeldahl distillation head is described.

542.48 : 665.52 : 545.727 *see Abstr.* 2545

542.66 2530

Modified construction of an automatic siphon. YARDLEY, V. A. *J. Sci. Instrum.*, 22, *p.* 115, *June*, 1945.

542.67 2531

Methods for the evaluation of analytical filter papers. SCRIBNER, B. W., AND WILSON, W. K. *J. Res. Nat. Bur. Stand., Wash.*, 34, *pp.* 453–459, *May*, 1945.—Improved methods for rate of flow of water, retention of fine precipitates, and determination of ash, were developed. The use of complicated apparatus for measuring the rate of flow of water was avoided by applying Darcey's law to the ordinary conical filter. The use of pre-filtered water in making the measurement was found necessary for satisfactory reproducibility. For determining the ash content of paper, a tare crucible is used and the test specimen wetted and pressed into a compact wad to permit the use of as small a crucible as possible. The other tests were bursting strength of wet paper, thickness, weight per unit area, alpha cellulose, copper number, and acidity (*p*H).

542.74 : 542.231 *see Abstr.* 2527

542.74 : 621.369.2 2532

Air drying by activated alumina. *Engineering*, 159, *pp.* 517–518, *June* 29, 1945.

542.929.4 : 541.127 *see Abstr.* 2461

542.952.6 2533

Mechanism of vinyl polymerization. I. Rôle of oxygen. BARNES, C. E. *J. Amer. Chem. Soc.*, 67,

pp. 217–220, *Feb.*, 1945.—An explanation is given for the frequently observed inhibiting action of oxygen on the photo-polymerization of vinyl compounds and some additional data are presented. It is shown that oxygen exerts a similar inhibiting action on thermal polymerization, and that both processes involve peroxide formation in preference to polymerization.

542.952.6 : 541.182.5 2534

Gel formation in addition polymerization. WALLING, C. *J. Amer. Chem. Soc.*, 67, *pp.* 441–447, *March*, 1945.—An equation is deduced predicting the gel point in the addition polymerization of a mixture of mono- and bi-functional monomers. Gel points for the systems methyl methacrylate-ethylene dimethacrylate and vinyl acetate-divinyl adipate are determined under various conditions; the results agree reasonably with the equation in the presence of $<0{\cdot}2$ mole% of bifunctional monomer. Results in the presence of more bifunctional monomer are explained qualitatively by considering the reaction mixture to consist of discrete swollen polymer molecules, the rate of diffusion of which is slow compared with the rate of polymer chain growth. On this basis, gelation is expected to occur when these swollen molecules have filled 13–23% of the reaction mixture. Experimental values of 25–46% agree with calculation.

W. R. A.

542.978 : 614.841 2535

The effect of chemicals in water solution on fire extinction. BRYAN, J., AND SMITH, D. N. *Engineering*, 159, *pp.* 457–460, *June* 8, *and pp.* 497–500, *June* 22, 1945.—Experiments are described on the extinction of standard fires under careful mechanically controlled conditions, with a method of recording continuously the loss in wt., by a jet playing on a rotating fire. Data for the relative eff. of solutions of a number of different chemicals are tabulated, plotted, and expressed as the traditional superiority factor, i.e. the ratio of water required to extinguish the fire to the amount of solution required to produce the same effect. NH_4 compounds (especially $NH_4H_2PO_4$ and $(NH_4)_2HPO_4$) show the most effective extinguishing properties. To assess the effectiveness in practice of different concs. of solution, and variation in effect at different stages of burning, a method of test employing a continuous application of liquid at varying rates is described. Data are discussed with reference to practical application. Results show that the true superiority is not the original "time superiority" factor, but is "volume superiority" factor, or ratio of vol. of water to vol. of solution necessary to extinguish the fire in the same time, and tends to a constant max. representing the max. potential fire fighting capacity of the solution, and this can be used for directly comparing relative efficiencies of different solutions irrespective of delivery. The potential fire-fighting capacity of water can be increased from 2 to 5 times by adding from 1·6–19% of $NH_4H_2PO_4$.

N. M. B.

543.862.12 : 621.369.4 2536

Use of infra-red heat in determining aniline points. HOPKINS, H. T. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *p.* 269, *April*, 1945.

544 : 669.14 : 535.247.4 *see Abstr.* 2226

544.68 2537

Spectrographic limit of detection of phosphorus, titanium, and zirconium in the direct current arc. NORMAN, D. P., AND JOHNSON, W. W. A. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 233–235, *April*, 1945.—A cored graphite electrode was used as the cathode of a conventional d.c. arc operated at 15 A and contained the weighed samples. The spectra were observed in the first order of a 3-m. grating spectrograph, dispersion 5·6 Å/mm., by a jumping-plate technique. $\lambda 2553{\cdot}28$ proved to be the most satisfactory line for the detection of P. The limit of detection of P, i.e. the smallest amount detectable with certainty, ranged from 0·05–0·80 microgram in 9 different standards containing from 0·0013–0·59% P. $\lambda 3371{\cdot}45$ was the most satisfactory for Ti; the limit of detection ranged from 0·04–4 micrograms in 12 samples containing from 0·0018–0·23% Ti. The optimum line for Zr was $\lambda 3391{\cdot}98$ of the ionized atom. The limit of detection of Zr varied from 0·5–4 micrograms in 6 samples containing from 0·0037–0·19% Zr.

545.31 2538

Sulphamic acid as an aid in the analytical electrodeposition of copper. SILVERMAN, L. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 270–271, *April*, 1945.

545.37 2539

Application of the Ilkovič equation to quantitative polarography. BUCKLEY, F., AND TAYLOR, J. K. *J. Res. Nat. Bur. Stand., Wash.*, 34, *pp.* 97–114, *Feb.*, 1945.—Conditions of applicability of the Ilkovič equation to polarographic analysis were investigated for representative ions singly and in mixtures. Gelatin was used to suppress maxima found in current/voltage curves. Results obtained with a capillary of usual characteristics showed that a suppresser is necessary to secure agreement with the Ilkovič equation over any considerable drop-time range, and that the need increases with the drop-rate of the electrode and the dilution of reducible ion. A criterion of diffusion control satisfactory for classification of polarograms by visual examination was found. The application of the Ilkovič equation to quantitative analysis was shown to be inadvisable unless it is definitely established that the experimental conditions are well within the range for insuring diffusion control. A logarithmic relation between critical drop-time and suppressor concentration was found.

545.37 2540

Polarographic characteristics of vanadium in its various oxidation states. LINGANE, J. J. *J. Amer. Chem. Soc.*, 67, *pp.* 182–188, *Feb.*, 1945.—From both acid and ammoniacal media $V^{\cdot\cdot\cdot\cdot\cdot}$ undergoes stepwise reduction at the dropping Hg-electrode to $V^{\cdot\cdot\cdot\cdot}$ and finally to $V^{\cdot\cdot}$. In 0·05 *N* H_2SO_4 the diffusion current of the first stage starts at zero applied e.m.f., and the half-wave potential of the second stage is $-0{\cdot}97$ *V* against the standard calomel electrode. In 0·1 *N* H_2SO_4 $V^{\cdot\cdot\cdot\cdot}$ is reduced irreversibly to $V^{\cdot\cdot}$ and the poorly-developed wave has a half-wave potential of $-0{\cdot}85$ *V* against the standard calomel electrode. Reduction of $V^{\cdot\cdot\cdot\cdot}$ from *M* solutions of H ions is practically completely masked by the reduction of $H^{\cdot}$. $V^{\cdot\cdot\cdot\cdot}$ from its *N* NaOH or KOH solutions

shows no indication of a reduction wave, but a well-developed anodic wave is obtained, corresponding to oxidation to $V^{\bullet\bullet\bullet\bullet\bullet}$, with a half-wave potential of $-0{\cdot}42$ V against the standard calomel electrode. The anodic diffusion current is proportional to the concentration of $V^{\bullet\bullet\bullet\bullet}$, and the shape of the wave corresponds closely with a reversible one-electron oxidation. Both the reduction of $V^{\bullet\bullet\bullet\bullet\bullet}$ to $V^{\bullet\bullet}$, and the reverse oxidation, are practically reversible at the dropping Hg-electrode from an acid medium. In $N\,H_2SO_4$ both waves are well-developed, with an average half-wave potential of $-0{\cdot}52$ V against the standard calomel electrode. Reduction of V below the $V^{\bullet\bullet}$ state was not encountered. W. R. A.

545.37 2541

Polarographic determination of vitamin C in fruits and vegetables. GILLAM, W. S. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 217–221, *April*, 1945.

545.371 2542

Potentiometric determinations of H-ion concentration in hydrocarbon oils. GEMANT, A. *J. Chem. Phys.*, 13, *pp.* 146–154, *April*, 1945.—Oils were measured that have attained high electrical conductivity (*a*) through oxidation in the laboratory, (*b*) through deterioration in service, (*c*) through addition of certain compounds. The e.m.f. data are interpreted by comparison with those of lauryl sulphonic acid solutions in oil. The results indicate that the H ion concentration in the three types of oils is too low to account for the total observed conductivity. It is shown that the predominant mechanism of ion generation is different from the usual acidic dissociation. A bimolecular reaction leading to 2 organic ions is suggested and a quantitative relation following from the conductivity data established.

545.372 : 541.135.5 2543

Determination of copper in copper proteins using the dropping mercury electrode. AMES, S. R., AND DAWSON, C. R. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 249–253, *April*, 1945.—A specific method for the determination of Cu in Cu proteins involves use of the dropping Hg-electrode after an acid extraction of the Cu. The base solution for analysis is an acid Na citrate buffer containing 0·005% fuchsin as a maximum suppressor. The half-wave potential at 25·0°C. for cupric ion in the base solution is $-0{\cdot}18$ V against the saturated calomel electrode. The diffusion coefficient at 25·0°C. of the cupric citrate complex is equal to $0{\cdot}43 \times 10^{-5}$ $cm.^2\,sec.^{-1}$ Practical limits of the method are from 1 to 75–100 μg./ml. of Cu in the base solution with an average deviation of $\pm 3\%$.

545.72 : 545.8 : 621.386.1 : 621.791.75 2544

A preliminary investigation of the constitution of mild-steel arc-weld deposits. SLOMAN, H. A., ROONEY, T. E., AND SCHOFIELD, T. H. *J. Iron Steel Inst.*, 29 *pp.*, *July*, 1945. *Advance copy.*—[Abstr. 2269 B (1945)].

545.727 : 542.48 : 665.52 2545

Analysis of the light constituents in crude petroleum by low-temperature fractional distillation. ASKEVOLD, R. J., AND AGRUSS, M. S. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *p.* 241, *April*, 1945.

545.8 : 541.14 *see Abstr.* 2485

545.8 : 621.386.1 : 621.791.75 : 545.72 *see Abstr.* 2544

545.81 2546

Colorimetric estimation of aluminium in aluminum steel. CRAFT, C. H., AND MAKEPEACE, G. R. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 206–210, *April*, 1945.—A method is presented for estimating acid-soluble Al in steel by means of NH_4 aurintricarboxylate in the range 0·04–1·5% Al. The method is rapid, and the accuracy is equal to that of routine gravimetric procedures.

545.81 2547

Determination of iron in the presence of cobalt. Two-component colorimetric method. BROWN, E. A. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 228–230, *April*, 1945.—A colorimetric thiocyanate method is given for the estimation of 0·07 to 0·5 mg. of Fe in the presence of variable amounts of Co up to 90 mg. A filter-type photometer with two colour filters is used to circumvent the interference of the Co ion colour. The method is rapid with an accuracy of $\pm 3\%$.

545.81 2548

Determination of cobalt in biological materials with nitrosocresol. ELLIS, G. H., AND THOMPSON, J. F. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 254–257, *April*, 1945.—A quantitative colorimetric procedure for the determination of from 0·02–25 μg. of Co in plant or animal tissues is described. The method depends on the formation of the coloured complex of Co with *o*-nitrosocresol which is extracted from the aqueous phase by ligroin and measured in a photo-electric colorimeter fitted with absorption cells 10 cm. in depth, requiring a volume of 1·8 ml.

545.81 2549

Colorimetric determination of minute amounts of nickel. PASSAMANECK, E. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 257–258, *April*, 1945.

545.81 2550

Acrolein determination by means of tryptophane. A colorimetric micromethod. CIRCLE, S. J., STONE, L., AND BORUFF, C. S. *Industr. Engng Chem.* (*Analyt. Edit.*), 17, *pp.* 259–262, *April*, 1945.—Compared with previous methods, this method of analysis of acrolein gives a spectrally purer colour with a max. in the absorption curve, a colourless blank, and greater specificity.

545.81 : 535.243 *see Abstr.* 2225

545.82 2551

The determination of nitrogen in ferro-alloys and other materials by direct Nesslerization without distillation. NEWELL, W. C. *J. Iron Steel Inst.*, 5 *pp.*, *May*, 1945. *Advance copy.*—The direct method, without distillation, for the colorimetric determination of N is further applied to the analysis of ferro-alloys by the addition of stabilizing colloids to the Nessler-NH_3 coloration.

545.82 : 669.14 2552

A microspectrographic method for the quantitative analysis of steel segregates. CONVEY, J., AND OLDFIELD, J. H. *J. Iron Steel Inst.*, 26 *pp.*, *May*, 1945. *Advance copy.*

545.822 2553

Spectrochemical analysis of beryllium ores and commercial products. STROCK, L. W. *J. Opt. Soc.*

Amer., 34, *p.* 772, *Dec.*, 1944.—Describes methods for rapid routine determination of Be in ores and commercial products. Ni is added as an internal intensity standard. The determination of impurities in BeO, Be–Cu alloy and Be metal and a new technique for establishing the major constituents of metallic alloy samples in a d.c. carbon arc are described. J. W. T. W.

545.822 2554

An application of spectrographic methods to chemical concentrations of trace elements in iron and steel analysis. WOLFE, R. A., AND FOWLER, R. G. *J. Opt. Soc. Amer.*, 34, *p.* 772, *Dec.*, 1944.—Describes a combined spectrographic and chemical method for the analysis of trace elements in steels, applicable to concs. below the sensitivity of either the ordinary chemical or spectrographic method. J. W. T. W.

545.822 2555

Spectrographic analysis of wrought copper alloys. LEICHTLE, P. A., AND WICHROWSKI, A. F. *J. Opt. Soc. Amer.*, 34, *pp.* 772–773, *Dec.*, 1944.—Discusses the spectrographic determination of trace elements and minor constituents in a wide variety of wrought Cu alloys. Tables of useful line pairs and approximate equal density values are given. [See Abstr. 173 (1945)]. J. W. T. W.

545.822 2556

The spectrochemical analysis of copper base alloys. JAYCOX, E. K. *J. Opt. Soc. Amer.*, 34, *p.* 773, *Dec.*, 1944.—Describes the analysis of Cu base alloys for Al, Pb and Sn (0·30–15%), Fe, Mn and Ni (0·30–5%) and Zn (0·30–40%). A solution with a fixed conc. of metal is mixed with a fixed $Cu(NO_3)_2$ solution and d.c. arc spectra are obtained for each sample and for a series of standard solutions. The amount of constituent element is found by measuring the ratio of the intensity of a line of the element to that of a Cu control line. J. W. T. W.

545.824 2557

Chemical analysis by X-ray absorption. LIEBHAFSKY, H. A., AND WINSLOW, E. H. *Gen. Elect. Rev.*, 48, *pp.* 36–39, *April*, 1945.—A description of routine measurements.

545.83 2558

Quantitative microchemistry in clinical laboratories. SOBEL, A. E. *Industr. Engng Chem. (Analyt. Edit.)*, 17, *pp.* 242–245, *April*, 1945.

545.844 2559

Separation and determination of aromatic and mono-olefin hydrocarbons in mixtures with paraffins and naphthenes by adsorption. MAIR, B. J. *J. Res. Nat. Bur. Stand., Wash.*, 34, *pp.* 435–452, *May*, 1945.—The mixture to be analysed is introduced into the top of a column of SiO_2 gel and, when the liquid level just reaches the top of the gel, a suitable desorbing liquid, such as EtOH, is added. The desorbing liquid forces the hydrocarbon portion down the column, during which passage the hydrocarbon portion is fractionated according to the adsorbability of the various components. These components issue from the bottom of the column in the following order: Paraffin + naphthene, mono-olefin, and aromatic hydrocarbons. The analysis is made by determining the fraction of the total vol. constituted by each of these classes. Results of the analyses of 5 solutions containing aromatic and paraffin hydrocarbons, and 3 solutions containing aromatic, mono-olefin, and paraffin hydrocarbons are given. A procedure is outlined for determining the aromatic content of a straight-run petroleum distillate, as in the gasoline or kerosine fractions.

548.0 : 534.321.9 2560

Shear modes in piezo-electric crystal plates. BHAGAVANTAM, S., AND SURYANARAYANA, D. *Nature, Lond.*, 155, *p.* 171, *Feb.* 10, 1945.

548.0 : 535.32 2561

Rodometric examination of quartz crystals. HOLTON, G. J. *Electronics*, 17, *pp.* 114–118 *and* 252, *May*, 1944.—The optical axis is approx. located by viewing through polarizing screens, and a surface normal to it (within 10°) is ground and etched in HF for 2–3 hr. A thin parallel beam of light projected through the crystal parallel to the optical axis, emerging from the ground "window," forms a characteristic star and spot pattern on a translucent screen. The position and sense of the *X* and *Y* axes, the "hand" of the crystal and the direction of the *Z* axis can be determined within about $^1/_4°$ from the pattern. Twinning is revealed. The apparatus is used to align the crystal axes in relation to a glass mounting plate, to which the crystal is cemented after adjustment. The mounted crystal can then be properly set for sawing. C. F. B.

548.0 : 535.43 2562

Scattering of light in crystals. RAMAN, C. V. *Nature, Lond.*, 155, *pp.* 396–397, *March* 31, 1945.—Discusses the fact that some theories of the solid state are at variance with experiment in that they assume, or claim to show, that the atomic vibration spectrum of a crystal in the infra-red region is continuous whilst experiment gives in some cases (e.g. calcite) a sharp line spectrum with no trace of a continuum. A. H.

548.0 : 536.76 2563

Sub-crystalline changes of structure accompanying thermal transitions in Rochelle salt, and in potassium dihydrogen orthophosphate. UBBELOHDE, A. R., AND WOODWARD, I. *Nature, Lond.*, 155, *pp.* 170–171, *Feb.* 10, 1945.

548.0 : 539.32 2564

Elastic constants of piezo-electric crystals. Zinc sulphide. BHAGAVANTAM, S., AND SURYANARAYANA, D. *Proc. Indian Acad. Sci. A*, 20, *pp.* 304–309, *Nov.*, 1944.—An experimental method of detecting and measuring the resonance frequencies of piezo-electric crystal plates is described. The elastic constants of zinc blends have been obtained by this method as $C_{11} = 10{\cdot}79 \times 10^{11}$; $C_{12} = 7{\cdot}22 \times 10^{11}$ and $C_{44} = 4{\cdot}12 \times 10^{11}$ dynes/cm.^{2} [see Abstr. 2565 (1945)].

548.0 : 539.32 : 534.321.9 2565

Elastic constants of crystals. A new method and its application to pyrites and galena. BHAGAVANTAM, S., AND BHIMASENACHAR, J. *Proc. Indian Acad. Sci. A*, 20, *pp.* 298–303, *Nov.*, 1944.—A new method for determining the elastic constants of crystals, based on the transmission of longitudinal sound waves, is given, using a continuous ultrasonic spectrum and the Debye–Sears effect as a delicate test for detecting max. transmission. The method needs to be supplemented by at least one static-torsion experiment to obtain the

complete system of elastic constants. It has been applied to the cases of pyrites and galena. Voigt's results on pyrites are confirmed and values for the elastic constants of galena are given.

548.0 : 539.56 *see Abstr.* 2433

548.1 2566

Crystal structure of barium titanate. MEGAW, H. D. *Nature, Lond.*, 155, *pp.* 484–485, *April* 21, 1945.

548.1 : 513.3 2567

Particle shape. WHITTAKER, E. J. W., SMITHSON, F., TOMKEIEFF, S. I. *Nature, Lond.*, 155, *pp.* 331–332, *March* 17, *and Corres., pp.* 639–640, *May* 26, 1945.—A definition of criteria for distinguishing needle shapes from plates.

548.1 : 517.512.2 2568

Fourier transforms and structure factor. WRINCH, D. *Phys. Rev.*, 67, *p.* 198, *March* 1 *and* 15, 1945.—This paper summarizes the properties of Fourier transforms with special reference to their use in crystal analysis. Every distribution has its own characteristic Fourier transform and it is shown how, once recorded, it can be used for the determination of its contribution to the structure factor of any crystal in which it is part of the unit pattern, since the Fourier transform of any lattice of points is also a lattice of points, namely the reciprocal lattice. Among those whose Fourier transforms are recorded are many simple point distributions, which yield the Fourier transforms of like atoms placed at such point sets when multiplied by the atomic scattering factor. Fourier transforms are also recorded for a number of mega-distributions including patterned cube and octahedral volumes and the corresponding shells and surfaces. The application of these transforms to the structure factors of small crystals is discussed. The Fourier transforms of a number of finite continuous distributions through cube and octahedral volumes and shells and on cube and octahedral surfaces are included.

548.1 : 519.4 2569

Character tables for two space groups. HERRING, C. *J. Franklin Inst.*, 233, *pp.* 525–543, *June*, 1942.—The construction of character tables for the irreducible representations of space groups is fairly easy when each lattice point of the group possesses the full symmetry of the point group, but when this symmetry is lacking the construction is more laborious. Tables of the characters are given for the 2 most important groups not possessing the symmetry mentioned (i) the group D^4_{6h} (close-packed hexagonal) and (ii) D^7_h (diamond type). The general theory of representations is discussed. L. S. G.

548.1 : 531.718 *see Abstr.* 2158

548.1 : 548.73 2570

The crystal structures of metallic fluoberyllates, double fluoberyllates and sulphato-fluoberyllates. MUKHERJEE, P. L. *Indian J. Phys.*, 18, *pp.* 148–158, *June*, 1944.—Crystals of the fluoberyllates of Rb, Tl, K and NH_4 were studied goniometrically and by X-rays. These crystals are isomorphous among themselves as well as with the crystals of the sulphates of the corresponding metals, both as regards crystal class and axial lengths. The space group of the crystals of the K compound was determined and found identical with that of K_2SO_4. Crystals of the double fluoberyllates (*a*) $Zn(NH_4)_2(BeF_4)_2 . 6H_2O$, (*b*) $Co(NH_4)_2(BeF_4)_2 . 6H_2O$, and (*c*) $Ni(NH_4)_2(BeF_4)_2 . 6H_2O$ and also of the substance $NiK_2BeF_4 SO_4 . 6H_2O$ are isomorphous among themselves as well as with the sulphates. The axial lengths of $Ni(NH_4)_2(BeF_4) . 6H_2O$ were measured and found identical with those of corresponding double sulphate.

548.1 : 549.211 2571

Are there four possible diamond structures? LONSDALE, K. *Nature, Lond.*, 155, *p.* 144, *Feb.* 3, 1945.—[See Abstr. 2637 (1944)].

548.2 2572

A method of growing oriented sections of certain optical crystals. WEST, C. D. *J. Opt. Soc. Amer.*, 35, *pp.* 26–31, *Jan.*, 1945.—A method is described for growing extended crystal sections normal to a 3-fold axis from melts of $NaNO_3$, and of alkali halides (KBr, KI). Such sections result when crystallization in the melt is started at a mica cleavage surface and is allowed to proceed in a direction normal thereto, the mica acting as an insoluble, infusible seed for the new crystal growth. The mica cleavage surface adsorbs from the melt a hexagonal net of alkali ions whose side is 5·17 Å, and this plane net constitutes the first layer of the new crystal growth.

548.24 : 553.621 2573

Terminology of interpenetrating twins in α-quartz. THOMAS, L. A. *Nature, Lond.*, 155, *p.* 424, *April* 7, 1945.

548.32 2574

Isomorphic relationship between rubidium and thallium in igneous minerals. AHRENS, L. H. *Nature, Lond.*, 155, *p.* 610, *May* 19, 1945.

548.526 : 669.14 : 539.378.3 *see Abstr.* 2405

548.7 : 536.77 : 531.19 2575

A generalization of the quasi-chemical method in the statistical theory of superlattices. YANG, C. N. *J. Chem. Phys.*, 13, *pp.* 66–76, *Feb.*, 1945.—The quasi-chemical method in the investigation of the equilibrium distribution of atoms in the pairs of neighbouring sites in a superlattice is generalized by considering groups containing large numbers of sites. The generalized method may be used to obtain successive approximations of the free energy of the crystal. Integration is avoided by introducing a Legendre transformation. To analyse the fundamental assumption underlying the method more closely, the number of arrangements of the atoms for given long-distance order is calculated, and the hypothesis of the non-interference of local configurations is discussed. The method is applied to the calculation of the free energy in the different approximations discussed, including Bethe's second approximation and a simple approximation for the face-centred cubic crystal Cu_3Au.

548.73 2576

On the origin of extra spots in Laue photographs. SIRKAR, S. C., AND BISHUI, B. M. *Proc. Nat. Inst. Sci. India*, 8, 2, *pp.* 217–231, 1942.—The experimental results published by previous workers and those obtained by the authors on the properties of the extra spots in Laue photographs are discussed in the light of the theories of diffuse scattering and of quantum reflection. The length of the streamers and the

structure of the extra spots observed in the case of diamond with particular glancing angles of incidence cannot be explained by the theory of quantum reflection (Raman and Nilakantan), but the details can be explained by the theory of diffuse scattering (Zachariasen). In the case of diamond, the observed directions of maxima also agree with Zachariasen's theory and the observed influence of temperature is given satisfactorily by the wave-mechanical theory (Born and Sarginson). The ratio of the intensity of diffuse scattering to that of Laue spot due to the ||| plane of diamond increases with the increase of thickness of the crystal. These results are contradictory to the theory of quantum reflection and also to the results obtained by Venkateswaran in the case of NaCl.

548.73 2577

Photography of crystal structures. HUGGINS, M. L. *J. Chem. Phys.*, 12, *p.* 520, *Dec.*, 1944.—Bragg's method of photographic summation of Fourier series by addition of the proper patterns of light and dark bands can be improved in accuracy and speed by the use of a previously prepared set of masks [see Abstr. 460 (1941)]. An improved set of 316 masks is reported, with which electron density photographs of crystal structures and Patterson summations are easily and rapidly made from the appropriate X-ray data.

548.73 2578

A "reference" precipitated tricalcium phosphate hydrate. MACINTIRE, W. H., PALMER, G., AND MARSHALL, H. L. *Industr. Engng Chem.*, 37, *pp.* 164–169, *Feb.*, 1945.—Tricalcium phosphate hydrate, for use as a reference substance, is prepared by the slow addition of concentrated H_3PO_4 to lime-concentrated sucrose solution. Stability in composition and reproducibility of product are established by X-ray and chemical analysis. Differentiation between this substance and hydroxyapatite may be effected by comparison of their 900°C. calcines. J. T.

548.73 2579

The influence of absorption on the shapes and positions of lines in Debye–Scherrer powder photographs. TAYLOR, A., AND SINCLAIR, H. *Proc. Phys. Soc., Lond.*, 57, *pp.* 108–125, *March*, 1945.—Simple graphical methods of determining the basic line-contours for powder diagrams taken in cylindrical Debye–Scherrer cameras are described. From these contours the absorption factor may be obtained for any given Bragg angle and dilution of the specimen. The contours also enable the position of the line peaks to be calculated for different sets of experimental conditions. This, in turn, opens up the possibilities of new types of extrapolation curves for the accurate determination of lattice parameters.

548.73 2580

On the determination of lattice parameters by the Debye–Scherrer method. TAYLOR, A., AND SINCLAIR, H. *Proc. Phys. Soc., Lond.*, 57, *pp.* 126–135, *March*, 1945.—The types of systematic error arising in the determination of lattice parameters by the use of Debye–Scherrer powder diagrams are discussed. The various extrapolation methods are reviewed, and it is shown how a consideration of the absorption factor and geometry of the focal spot lead to the most satisfactory forms of extrapolation curve. It is shown how the absence of specimen eccentricity enables perfectly linear extrapolation curves to be drawn, thus allowing fullest use to be made of low-angle reflections, whereby the highest accuracy in parameter determination may be achieved.

548.73 2581

The X-ray investigation of copper *dl*-α-amino-butyrate. STOSICK, A. J. *J. Amer. Chem. Soc.*, 67, *pp.* 362–365, *March*, 1945.—The unit cell is monoclinic with $a = 11{\cdot}09$ Å, $b = 5{\cdot}06$ Å, $c = 9{\cdot}45$ Å, and $\beta = 87° 51'$. The probable space group is C_{2h}^5–$P_c^{2_1}$ and there are two molecules per unit cell. The existence is shown of coplanar co-ordination of carboxyl O atoms and amino N atoms around the Cu atoms. Patterson and Fourier projections are employed. J. T.

548.73 2582

The crystal structure of nickel glycine dihydrate. STOSICK, A. J. *J. Amer. Chem. Soc.*, 67, *pp.* 365–370, *March*, 1945.—The unit cell is monoclinic with $a = 7{\cdot}60$ Å, $b = 6{\cdot}60$ Å, $c = 9{\cdot}63$ Å and $\beta = 63° 25'$. The probable space group is C_{2h}^5–$P_c^{2_1}$ and there are two molecules per unit cell. The structure consists of slightly distorted, octahedrally co-ordinated complexes of two glycine residues and two water molecules about the Ni atoms. Patterson and Fourier projections are employed. J. T.

548.73 2583

X-ray crystallography of kojic acid. FOX, A. H. *Nature, Lond.*, 155, *p.* 397, *March* 31, 1945.

548.73 2584

The validity of the pole figure. DECKER, B. F. *J. Appl. Phys.*, 16, *pp.* 309–310, *May*, 1945.—A [110] pole figure for cold-rolled and annealed silicon steel, constructed from data obtained with an integrating X-ray camera, is compared with a stereographic projection of [110] poles for 100 individual grains in the same samples. From this comparison, it is concluded that pole figures are accurate enough to determine preferred orientations when the exact percentage of crystals in each orientation is not required.

548.73 2585

Some techniques for the growth and preparation of micro-specimens for X-ray diffraction studies. FANKUCHEN, I. *Phys. Rev.*, 67, *p.* 197, *March* 1 *and* 15, 1945.—This paper presents techniques for the recrystallization on a micro-scale of materials for X-ray study from both solution and the melt. Techniques are also presented for mounting such specimens both in air and sealed in capillary tubes. The use of a micro-camera for the study of local variation in structure was discussed.

548.73 2586

An experimental investigation of extrapolation methods in the derivation of accurate unit-cell dimensions of crystals. NELSON, J. B., AND RILEY, D. P. *Proc. Phys. Soc., Lond.*, 57, *pp.* 160–177, *May*, 1945.—Measurements on X-ray photographs of cylindrical specimens of different absorption and thickness taken in a camera without eccentricity show that the absorption error in the apparent unit-cell dimension a $\propto \cos^2\theta(\mathrm{cosec}\,\theta + \theta^{-1})$. The plot of a against

$\frac{1}{2}\cos^2\theta(\mathrm{cosec}\,\theta + \theta^{-1})$ is linear down to $\theta = 30°$ for all 4 specimens used. The extrapolated values for a are in good agreement, and this extrapolation function is recommended in the case of data from well constructed cameras. Other extrapolation functions are also considered, and the effect of various sources of error discussed.

548.73 : 518.5 2587

A method for calculating reciprocal spacings for X-ray reflections from a monoclinic crystal. BOOTH, A. D. *J. Sci. Instrum.*, 22, *p.* 74, *April*, 1945.—The device consists of 2 perpendicular scales graduated in mm. upon one of which the extremity of a similarly divided hypotenuse scale can be set at any distance from the origin.

548.73 : 531.743 2588

The two-circle goniometer in the X-ray laboratory. TUNELL, G. *Phys. Rev.*, 67, *pp.* 197–198, *March* 1 *and* 15, 1945.—The principal uses of the two-circle goniometer in the X-ray laboratory are the orientation and adjustment of faceted crystals for X-ray diffraction photographs and the preliminary determination of axial elements. There are 3 types of two-circle goniometer; the Goldschmidt, the Czapski, and the Fedorov. None of these is available in the U.S. at present. If one is to be manufactured, it is imperative that the adjustment head be made interchangeable with the Weissenberg, oscillation, and Laue cameras on the market.

548.73 : 535.312 : 549.211 ; 537.531
see Abstr. 2308–2310

548.73 : 537.531 : 535.34 2589

Breadths of X-ray diffraction lines and mechanical properties of some cold-worked metals. MEGAW, H. D., AND STOKES, A. R. *J. Inst. Met.*, 12, *pp.* 279–289, *June*, 1945.—The breadths of X-ray diffraction lines from cold-worked Fe, Ni, Cu, Ag, Al and Pb were measured, and shown to agree with those calculated from the mechanical properties of the metals on the assumption that the crystals are stressed up to the ultimate tensile limit.

548.73 : 539.215.4 2590

X-ray diffraction examination of γ-alumina. JELLINEK, M. H., AND FANKUCHEN, I. *Industr. Engng Chem.*, 37, *pp.* 158–163, *Feb.*, 1945.—The results of the controlled heating of γ-alumina are investigated by low- and high-angle scattering of X-rays. Heating is found to increase both crystallite and particle size. The size of the cubic unit cell is given as 8·4 Å. J. T.

548.73 : 539.26 *see Abstr.* 2393

548.73 : 539.388.1 2591

An X-ray diffraction study of the fatigue in metals at high stresses. BARKOW, A. G. *J. Appl. Phys.*, 16, *pp.* 111–120, *Feb.*, 1945.—Results are given of an X-ray diffraction study of 14 specimens of an Al alloy, 14 ST, at various cycles and stresses. A description is given of the preparation of the specimens and of the back reflection camera used [Abstr. 2393 (1943)]. The specimens were fatigued at stresses ranging from 25 000 lb./in². to 40 000 lb./in². L. S. G.

548.73 : 548.1 *see Abstr.* 2570

548.73 : 548.74 : 541.128 2592

A review of the application of X-ray and electron diffraction methods to contact catalysis. MILLIGAN, W. O. *Phys. Rev.*, 67, *p.* 197, *March* 1 *and* 15, 1945.—The results of X-ray and electron diffraction examination of contact catalysts is reviewed from the point of view of (*a*) identification of compounds in catalysts; (*b*) compounds formed during treatment or use; (*c*) small angle scattering; and (*d*) relation between catalytic activity and (1) lattice constants, (2) intensities, (3) crystal size, (4) orientation. The mechanism of the formation of active catalyst is discussed from the point of view of (*a*) protective action, (*b*) solid solutions, (*c*) amorphous and crystalline states, (*d*) order and disorder, (*e*) distortion of crystal lattices. The state of absorbed substances and the potentialities of electron microscopic examination of catalysts are considered briefly. A bibliography of 135 references is included.

548.73 : 576.858.8 2593

X-ray crystallographic measurements on a single crystal of a tobacco necrosis virus derivative. CROWFOOT, D., AND SCHMIDT, G. M. J. *Nature, Lond.*, 155, *pp.* 504–505, *April* 28, 1945.—The crystals were 1–5 mm. across, and appeared to be of two forms: thick triclinic prisms and thin hexagonal or pseudo-hexagonal plates. X-ray data for the thickest crystal, which was of the first kind, showed that it was triclinic, with $a = 179, b = 219, c = 243$ Å, $\alpha = 87\frac{1}{2}°$ $\beta = 97\frac{1}{2}°$, $\gamma = 97\frac{1}{2}°$ (reduced cell), space group $P1$. Photographs with the crystal "still" show numbers of X-ray reflections, and these, though individually unresolved, are characteristically arranged on the plate in series of concentric circles or ellipses. Oscillation photographs give further details of crystal structure. There are probably 4 units in the face-centred unit cell. The crystal structure suggests that the molecules are approximately spheres, and on this view the estimated mol. dimensions are $\simeq$ 80–100 Å. radius in one direction. The sedimentation const. and other evidence indicate a mol. wt. of $\lessdot$1 850 000. N. M. B.

548.73 : 621.386 : 539.26 *see Abstr.* 2394, 2395

548.73 : 669.721.5 2594

The crystal grain orientation in a rolled magnesium alloy. HARGREAVES, A. *J. Inst. Met.*, 71, *pp.* 73–86, *Feb.*, 1945.—The preferred orientation of the crystal grains in Elektron AM503 alloy sheet was examined by X-ray methods. In the surface of the sheet, the basal plane normals [0001] of the crystal grains are normal to the plane of the sheet, but in the centre of the sheet they tend to align themselves along one of two most probable directions inclined at approx. 15° on either side of the normal to the sheet and lying in the plane containing the rolling direction and the sheet normal. There is a gradual transition from one type of basal plane orientation to the other on passing from the surface to the centre of the sheet. The hexagon edges [11$\bar{2}$0] of the crystal grains are oriented parallel to the rolling direction in the surface of the sheet, but are oriented at random about the [0001] axes in the central regions of the sheet.

548.73 : 678.7 2595

The structure of polyisoprenes. I. The crystal structure of geranylamine hydrochloride. II. The structure of β-guttapercha. JEFFREY, G. A. *Proc. Roy. Soc. A*, 183, *pp.* 388–404, *June* 18, 1945. *Trans. Faraday Soc.*, 40, *pp.* 517–520, *Nov.*, 1944.—I. The crystal structure and molecular dimensions are

stablished by an X-ray analysis employing three-imensional Fourier syntheses. The molecules have *trans* configuration (similar to guttapercha) and lie arallel and end to end in pairs within an ionic frame-ork where each N atom is equidistant from four l neighbours. The 2 isoprene units are planar and ave normal interatomic distances, but are linked by C–C bond markedly shorter than a normal single ond. This unusual feature is accompanied by a oplanar arrangement with adjacent C bonds. ables are given of the calculated and observed tructure factors. II. Present X-ray diffraction data re insufficient to distinguish fine details of molecular tructure. A basis for a model of the β-guttapercha olecule is provided by the structure analysis of art I, and this model differs considerably from that roposed by Bunn [Abstr. 1684 (1942)]. No evidence xists for the distortion of the methyl group out of the lane of the double bond previously ascribed to the olecule. For Part III see Abstr. 1420 (1945).

L. S. G.

48.73 2596

Photography of crystal structures by optical Fourier ynthesis. HUGGINS, M. L. *Phys. Rev.*, 67, *p.* 197, *March* 1 *and* 15, 1945.—[See Abstr. 460 (1941)]. A uitable set of band patterns was prepared on a roll f 35 mm. film. With this, typical electron-density nd Patterson projections were made in less than hr. The electron-density projections, so obtained, re true pictures of the unit of structure, magnified 10^8 or more times. The atoms are readily dis-nguished, as in the corresponding contour maps rawn from the results of the direct calculations.

548.74 : 541.128 : 548.73 *see Abstr.* 2592

549.211 : 535.312 : 548.73 : 537.531 *see Abstr.* 2308–2310

549.211 : 548.1 *see Abstr.* 2571

549.514.51 : 621.92 2597

Control of silica dust hazard in quartz crystal cutting nd grinding. GOSS, A. E. *J. Industr. Hyg. Toxicol.*, 26, *pp.* 208–209, *June*, 1944.—In operations using a iamond-edged circular saw and a recirculated soluble il-water coolant liquid, in order to prevent the issemination of silica dust into the atmosphere, the coolant liquid should be changed sufficiently frequently to keep the number of silica particles below 3×10^9 particles/cm.^{3} Manufacturing operations nd sampling procedures are described. C. J. G.

55(764) 2598

Geology, climate and soils of Texas. BAKER, C. L. *Proc. Trans. Tex. Acad. Sci.*, 27, *pp.* 181–187, 1943.

550 : 061.055.5 2599

Geophysical Laboratory. ADAMS, L. H. *Carnegie Instn Yearb.*, 43, *pp.* 21–22, 1943–1944.—Annual report.

550.3 : 061.055.1 2600

Summary of the year's work, to June 30, 1944, Department of Terrestrial Magnetism, Carnegie Institution of Washington. FLEMING, J. A. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 245–250, *Dec.*, 1944.

550.341 : 534.838.2 2601

Earthquake-resisting structures. VALENZUELA, J. I. *Engineer, Lond.*, 178, *pp.* 64–67, *Jan.* 26, 1945.—Reference is made to disastrous earthquakes in Chile, Japan and San Francisco, and the consequent urge to improve the resistant qualities of buildings. Research on models and earthquake records has resulted in a new theory which takes into account the earth oscillations and also the mass and elasticity of buildings, thereby enabling the forces acting on the various members of a structure to be calculated. Earth tremors are propagated by longitudinal waves radiated from the hypocentre, followed by slower transverse waves; these are followed by the principal waves from the epicentre. The irregular motion of the epicentre causes great danger to buildings. Earth tremors may have periods from a few 1/100 sec. up to 10 sec., but the most destructive waves have a period of 1–2 sec. In relation to the foregoing the natural periods of different structures are examined, and a description is given of an elasticity meter designed and constructed in the University of Chile. G. E. A.

550.381 2602

On the determination of magnetic vertical intensity, *Z*, by means of surface integrals. TAYLOR, J. H. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 223–237, *Dec.*, 1944.—The main result of the present paper is a separation of Z, the normal component of a magnetic field, into parts Z_e and Z_i due to external and internal sources, respectively. The resolution is given in terms of surface integrals whose integrands involve the observed surface values X and Z of the field. The paper may be regarded as a sequel to an article by Vestine [Abstr. 1229 (1941)].

550.381 2603

List of geomagnetic observatories and thesaurus of values. VII. FLEMING, J. A., AND SCOTT, W. E. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 267–269, *Dec.*, 1944.

550.381 : 061.055.5 2604

Department of Terrestrial Magnetism. FLEMING, J. A. *Carnegie Instn Yearb.*, 43, *pp.* 23–52, 1943–1944.—Annual report.

550.384 2605

Harmonic analysis of the annual variation of magnetic declination and horizontal intensity at Oslo, 1843–1930. WASSERFALL, K. F. *Terr. Magn. Atmos. Elect.*, 50, *pp.* 37–45, *March*, 1945.

550.384 : 523.746 2606

Solar and magnetic data, July to September, 1944, Mount Wilson Observatory. NICHOLSON, S. B., AND MULDERS, E. S. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 277–278, *Dec.*, 1944.

550.384 : 523.746 2607

Solar and magnetic data, October to December, 1944, Mount Wilson Observatory. NICHOLSON, S. B., AND MULDERS, E. S. *Terr. Magn. Atmos. Elect.*, 50, *pp.* 73–74, *March*, 1945.—[See Abstr. 2606 (1945)].

550.385 2608

Principal magnetic storms, July to September, 1944. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 279–280, *Dec.*, 1944.

550.385 2609

Principal magnetic storms, October to December, 1944. *Terr. Magn. Atmos. Elect.*, 50, *pp.* 75–78, *March*, 1945.—[See Abstr. 2608 (1945)].

550.389 2610

Mean *K*-indices from twenty-seven magnetic observatories and preliminary international character-figures for 1943. JOHNSTON, H. F. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 255–260, *Dec.*, 1944.

550.389 2611

American magnetic character-figure, C_A, three-hour-range indices, *K*, and mean *K*-indices, K_A, for July to September, 1944, and five international quiet and disturbed days for April to June, 1944. JOHNSTON, H. F. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 261–264, *Dec.*, 1944.

550.389 2612

American magnetic character-figure, C_A, three-hour-range indices, *K*, and mean *K*-indices, K_A, for October to December, 1944, and summary for year 1944. JOHNSTON, H. F. *Terr. Magn. Atmos. Elect.*, 50, *pp.* 47–55, *March*, 1945.

550.389 2613

Five international quiet and disturbed days for July to September, 1944. JOHNSTON, H. F. *Terr. Magn. Atmos. Elect.*, 50, *p.* 73, *March*, 1945.

550.822.2 2614

Application of mud analysis logging. SOUTHER, R. E. *Geophysics*, 10, *pp.* 76–90, *Jan.*, 1945.—The mud analysis logging system continuously analyses and records the oil and gas content of mud returns from wells being drilled by the rotary method. Oil or gas detected in the returning drilling fluid indicates oil or gas in the formation penetrated by the bit. Results of the continuous analyses are instrumentally correlated to the depths and formations from which the showings originated. A second useful phase of the system plots accurately and in detail rate of penetration or drilling speed on the log as a function of depth. Mud analysis logging can be practised in areas where the electrical log cannot be used due to high salt content or other local conditions, where dangerous hole conditions make interruption of drilling operations for coring inadvisable, and for evaluating gas zones where cores are difficult to interpret.

550.83 2615

History of the geophysical exploration of the Cameron Meadows Dome, Cameron Parish, Louisiana. MCGUCKIN, G. M. *Geophysics*, 10, *pp.* 1–16, *Jan.*, 1945.—The successive application, between 1926 and 1943, of various techniques to the exploration of a typical salt dome is described. These methods were: mechanical refraction seismograph (1926); torsion balance (1927); electrical refraction seismograph (1928–29); early correlation reflection seismograph (1929); dip reflection seismograph (1933); special salt profiling refraction seismograph (1942); continuous correlation reflection seismograph (1942); gravity meter (1943).

550.831 2616

Gravimeter prospecting for chromite in Cuba. HAMMER, S., NETTLETON, L. L., AND HASTINGS, W. K. *Geophysics*, 10, *pp.* 34–49, *Jan.*, 1945.—A report of gravimetric surveys in the chromite-bearing Camaguey District, Cuba, is given. The technical aspects of field work are discussed. Typical examples of gravity anomalies due to chromite deposits and to various igneous rock masses are presented.

550.831 2617

Estimating ore masses in gravity prospecting. HAMMER, S. *Geophysics*, 10, *pp.* 50–62, *Jan.*, 1945.—The interpretation of the results of gravitational prospecting surveys is considered theoretically in terms of the magnitude of the causative mass as distinct from the conventional interpretation in terms of the mass distribution (size, shape and depth). A general proof is based on Gauss's theorem in potential theory. Practical formulae are presented for estimating the total mass directly from the gravity data, and the precision of the mass estimate is considered. The method is applied to a practical gravimetric survey over a known chromite-ore body; the estimated mass agrees with estimates from core drilling.

550.834.5 2618

Early reflection seismograph exploration in California. SALVATORI, H. *Geophysics*, 10, *pp.* 17–33, *Jan.*, 1945.—A brief history of the discovery of the Wilmington and Rio Bravo fields is given and the seismic maps are compared with the later geologic maps compiled from well data.

550.837 : 621.317.39 2619

A geophysical prospecting instrument using alternating currents of audio-frequency. GUELKE, R. *J. Sci. Instrum.*, 22, *pp.* 141–145, *Aug.*, 1945.—[Abstr. 2039 B (1945)].

550.837.3 2620

Working depths for low-frequency electrical prospecting. LEWIS, W. B. *Geophysics*, 10, *pp.* 63–75, *Jan.*, 1945.—Electrical measurements were made on the surface of the earth with l.f. commutated current using 19 separate frequencies and 6 electrode separations. Analysis of the data indicates that there is an effect of appreciable magnitude attributable to an interface 6 000 ft. below the surface.

551.24 2621

Contemporaneous disturbances in lacustrine beds in Kenya. KENT, P. E. *Geol. Mag., Lond.*, 82, *pp.* 130–135, *May–June*, 1945.

551.243.1 2622

On the normal faulting of Rift Valley structures. DIXEY, F. *Geol. Mag., Lond.*, 82, *pp.* 136–137, *May–June*, 1945.

551.3.053 2623

Erosion and water supplies. STEBBING, E. P. *J. Roy. Soc. Arts*, 93, *pp.* 290–304, *May* 11, 1945.—The effect of the denudation of forests and of cultivation in general upon reduction of water supplies is reviewed and illustrated by examples drawn from Britain, India, South Africa, U.S.A., Australia. The most efficacious remedy suggested against the reduction is the closure of pasturage. Forests conserve rainfall, but it is still a matter of discussion whether they have any effect in increasing it.

J. S. G. T.

551.311.234.3 2624

Symposium on loess. *Amer. J. Sci.*, 243, *pp.* 225–303, *May*, 1945.—Foreword, Elias, M. K. The following papers were read: Loess and its economic importance, Elias, M. K. [Abstr. 2634 (1945)]; Pleistocene loess deposits of Nebraska, Schultz,

. B., and Stout, T. M. [Abstr. 2625 (1945)]; Glacial ersus desert origin of loess, Bryan, K. [Abstr. 2626 1945)]; A mechanical analysis of wind-blown dust ompared with analyses of loess, Swineford, A., and rye, J. C. [Abstr. 2629 (1945)]; Accumulation of dust n relation to herbaceous vegetation, Weaver, J. E.; eed of further researches on loess, Condra, G. E.; oess types and their origin, Obruchev, V. A. [Abstr. 627 (1945)]; Significance of loess in classification of oils, Thorp, J. [Abstr. 2633 (1945)]; Sequence of soil rofiles in loess, Williams, B. H. [Abstr. 2628 (1945)]; nfiltration into loess soil, Duley, F. L. [Abstr. 630 (1945)]; Characteristics and uses of loess in ighway construction, Bollen, R. E. [Abstr. 2632 1945)]; Observations on the properties of loess in ngineering structures, Watkins, W. I. [Abstr. 631 (1945)].

551.311.234.3 2625

Pleistocene loess deposits of Nebraska. Schultz, . B., and Stout, T. M. *Amer. J. Sci.*, 243, *pp.* 231–44, *May*, 1945.—Four important loesses are recogized in the Pleistocene of Nebraska. The stratigraphy f the Pleistocene sediments is reviewed with emphasis n the placement of loess deposits in relation to marl nd peat beds, buried soils, and terrace sequences. climatic interpretation is based upon a terrace cycle oncept in which loess is regarded as a product of rought and soil a result of relatively humid conitions. The Broadwater formation is described as arly Pleistocene in age and consisting of a basal and pper gravel deposit separated by finer textural ediments. A loess-like silt appears in the Lisco ember. A very late Pleistocene loess, the Bignell ormation, is named.

551.311.234.3 2626

Glacial versus desert origin of loess. Bryan, K. *mer. J. Sci.*, 243, *pp.* 245–248, *May*, 1945.—The ain source of loess is the outwash of glacial rivers ulverized by frost action. The main areas of its eposition were marginal to the region most affected y the glacial born anticyclonic winds combined with revailing westerlies. Steppe loess had its source in he adjacent deserts. The structural similarities in oesses of different origin are due to secondary rocesses induced by grass vegetation. Flood plains f Nebraska rivers, which in Pleistocene time were verloaded, glacial-fed streams, were the source of the oess in the State.

551.311.234.3 2627

Loess types and their origin. Obruchev, V. A. *mer. J. Sci.*, 243, *pp.* 256–262, *May*, 1945.—Loess is videspread in the southern part of European USSR nd extends through the Kirghiz steppe to Lake alkhash and farther north-west to Yakutia. Different ypes of loess are distinguished: primary loess of eolian origin and secondary loesses, redeposited and riginated by other processes. Degraded loess and ompact stone-loess are recognized. Dust from which rimary loess originated is believed blown by antiyclonic winds from fluvioglacial alluvium of glaciated reas and foreglacial deserts, and deposited over djacent prairies. In distinction from this "cold" oess, the other, "warm" primary loess has been lown from the exposed mountain ridges and foothill hallus of Central Asiatic Mountains and adjacent deserts, and deposited in the surrounding prairies, but part of the dust in these areas was also blown in from the distant areas of glaciation. An alternative soil-hypothesis ascribes the origin to soil-forming processes from any fine-grained formation deposited by water in foreglacial and foothill alluvial plains. Comparative petrographic, chemical, and mechanical analyses give little support to this hypothesis.

551.311.234.3 2628

Sequence of soil profiles in loess. Williams, B. H. *Amer. J. Sci.*, 243, *pp.* 271–277, *May*, 1945.—The time factor of soils developed from loess in western Nebraska is expressed in the character of the present soils. There is evidence that the soils on the tableland south of Chappell have developed from loess of two distinct periods of deposition.

551.311.234.3 : 551.311.3 2629

A mechanical analysis of wind-blown dust compared with analyses of loess. Swineford, A., and Frye, J. C. *Amer. J. Sci.*, 243, *pp.* 249–255, *May*, 1945.—A mechanical analysis was made of wind-blown dust collected in September, 1939, from the level of the third floor of the Lakeway Hotel, Meade, Kansas. Comparisons of this analysis with previously published analyses of loess and new analyses of Kansas loess seem to demonstrate that wind can be competent to sort material to the degree represented by some loess deposits.

551.311.234.3 : 551.579.5 2630

Infiltration into loess soil. Duley, F. L. *Amer. J. Sci.*, 243, *pp.* 278–282, *May*, 1945.—Field and laboratory tests were made to determine the infiltration rate for loessial soils. When these soils are bare, they seal over during rains and have their intake rate reduced in the same way as other soils. The intake rate can be greatly increased by covering the surface with a straw mulch. The effect of the mulch was much less on the raw, parent material of the Peorian loess. The absence of a well developed structure and shortage of binding material leads to excessive erosion on this soil.

551.311.234.3 : 624.1 2631

Observations on the properties of loess in engineering structures. Watkins, W. I. *Amer. J. Sci.*, 243, *pp.* 294–303, *May*, 1945.—Some personal observations on the properties of loess and loess-like materials which affect their behaviour in engineering structures. Most important of these are texture, chemical composition and the amount of moisture absorbed and held.

551.311.234.3 : 625.8 2632

Characteristics and uses of loess in highway construction. Bollen, R. E. *Amer. J. Sci.*, 243, *pp.* 283–293, *May*, 1945.—Some of the properties important in highway construction are described and discussed. Special physical tests of soils, which include loess, and which have been standardized by engineers, permit identification of their types and their expected performance as building material. Disturbances of soils due to exposure in cuts and to various subsequent engineering operations have important effect on their properties. Performance of loess in subgrades, as binder in stabilized base courses and filler in bituminous surfacing are described.

551.311.234.3 : 631.4 2633

Significance of loess in classification of soils. THORP, J. *Amer. J. Sci.*, 243, *pp.* 263–270, *May*, 1945.—The soils developed from loess vary considerably because of great variation in combination of factors involved in soil formation: climate, biological activity, relief and time. Besides, the character of loess, which is the parent material, also varies considerably. Drawing of the boundaries of types of soils in the soil survey of the Great Plains is helped considerably by the understanding of loess origin, thickness, and distribution.

551.311.234.3 : 631.4 : 625.8 2634

Loess and its economic importance. ELIAS, M. K. *Amer. J. Sci.*, 243, *pp.* 227–230, *May*, 1945.—Fertility of loess is its most valuable property. The principal wheat producing regions of the world roughly coincide with the areas of distribution of this golden earth of agriculture. Where it mantles the ground, the loess and the soils developed from it are the principal or, frequently, the only readily available material for roads, dams, and other engineering constructions.

551.311.3 : 551.311.234.3 *see Abstr.* 2629

551.463 : 535.345.1 *see Abstr.* 2245

551.510.535 : 523.74 : 537.311.37 *see Abstr.* 2301

551.574 : 536.42 *see Abstr.* 2273

551.579.5 : 551.311.234.3 *see Abstr.* 2630

553.621 : 535.375.5 *see Abstr.* 2251

553.621 : 539.32 *see Abstr.* 2404

553.621 : 548.24 *see Abstr.* 2573

576.858 : 582.951.4 : 621.384.4 : 535.212 *see Abstr.* 2216

576.858.8 : 548.73 *see Abstr.* 2593

577.15 : 541.124 *see Abstr.* 2450

578.088.9 : 534.321.9 *see Abstr.* 2206

581.036 : 541.144.7 *see Abstr.* 2490

582.951.4 : 576.858 : 621.384.4 : 535.212 *see Abstr.* 2216

591.1.044 : 539.166.92 *see Abstr.* 2377

591.112 : 532.57 *see Abstr.* 2178

591.18 2635

Neural mechanisms for the concepts of difference and similarity. LANDAHL, H. D. *Bull. Math. Biophys.*, 7, *pp.* 83–88, *June*, 1945.—A mechanism is described which reacts to differences in different modalities of a stimulus pattern. Another mechanism reacts to similarity; this is measured by the number of neurons common to the 2 stimulus patterns. L. S. G.

591.18 2636

A heterarchy of values determined by the topology of nervous nets. MCCULLOCH, W. S. *Bull. Math. Biophys.*, 7, *pp.* 89–93, *June*, 1945.—The function of reflexes, i.e. activities with a feed-back mechanism, includes all purposive activities. The latter are of dromic character and so the closed circuits sustaining them and their interaction may be treated topologically. The value anomaly is studied where A is preferred to B, B to C, but C to A. The apparent inconsistency of preference may be submitted to finite tolological analysis based on the finite number of nervous cells and their possible connections. L. S. G.

591.181 : 537.39 263

Effects of constant current in relation to "functional polarity." WINTERSTEIN, H., AND SEDEFCIYAN, A. *Nature, Lond.*, 155, *pp.* 238–239, *Feb.* 24, 1945.—Scheminzky and his co-workers found that a descending (head-to-foot direction) constant current passed through a frog produced paralysis (galvano-narcosis) and an ascending current produced convulsions. He attempted (*Pflügers Arch.*, 243, 439–456, 1940) to explain this by a "functional polarity," but experiments here recorded contradict and refute this. C. J. C.

611.018 263

A note on the physiological arrangement of tissues. MORALES, M. F., AND SMITH, R. E. *Bull. Math. Biophys.*, 7, *pp.* 47–51, *June*, 1945.—A presentation of the kinetics of uptake of an inert solute by tissues arranged in series, distinct parallel and competitive parallel, with respect to the circulation. The uptake is described by a series of exponentials, the number of terms and the constants depending upon the arrangement. The degree of coupling is reflected in the nature of the constants. L. S. G.

611.7 263

Dynamics of quadrupedal locomotion. HOUSEHOLDER, A. S. *Bull. Math. Biophys.*, 7, *pp.* 53–57, *June*, 1945.—Fischer's dynamical equations for unbranched systems in two dimensions are extended to the branched system exhibited by a quadruped. L. S. G.

612.76 : 531.1 *see Abstr.* 2147

612.84 264

A theory of photosensitivity of some lower animals. RUNGE, R. *Bull. Math. Biophys.*, 7, *pp.* 59–67, *June*, 1945.—The two-factor nerve excitation theory is used with the assumption that the threshold itself varies under the action of light, thus providing a third factor. A study is made of the dependence of the reaction time upon (i) the intensity of the stimulus, (ii) time of exposure to light of a fixed intensity, and (iii) dark adaptation. Light adaptation and the effects of termination of exposure after light adaptation are discussed. The theory is in agreement with observations. L. S. G.

612.84 : 535.7 *see Abstr.* 2262

612.84 : 535.733.1 *see Abstr.* 2265

613.6 : 535.7 *see Abstr.* 2263

614.841 : 542.978 *see Abstr.* 2535

616.0 264

Outline of a mathematical approach to the cancer problem. RASHEVSKY, N. *Bull. Math. Biophys.*, 7, *pp.* 69–81, *June*, 1945.—A relationship is derived which gives the probability of cancer incidence as a function of age. The relation is in agreement with the rather inadequate empirical data. A relation for the speed of wound healing as a function of age is also derived and is in agreement with observational data. Possibilities of practical applications are discussed. L. S. G.

616.9 : 541.127.2 *see Abstr.* 2462

620.193.19 264

The moisture content distribution in wood used as a partition between water and air. ROBERTS, H. D. *J. Coun. Sci. Industr. Res. Aust.*, 17, *pp.* 133–138, *Aug.*, 1944.—Six timber species were used in these

xperiments, the results of which indicate that when ne face of a 2 in. wooden partition is kept continuously vetted, and the other face continuously dry (such as ccurs in vats, casks, tanks, wood pipe, ship timbers tc.) a very high moisture gradient exists across the hickness of the partition once equilibrium is attained. n the species tested the average moisture content of he 0·2 in. thickness of wood nearest the wetted face ended to reach the average green moisture content of he species, whereas the average moisture content of he 0·2 in. thickness nearest the dry face (in contact with air) tended towards an average moisture content of about 14%. At a distance from 0·5 to 0·75 in. rom the wetted face, the moisture content tended to each equilibrium at approx. the fibre saturation oint for the species used. C. J. G.

620.193.92 : 541.132.3 *see Abstr.* 2476

624.15 : 531.2 *see Abstr.* 2148

631.4 : 551.311.234.3 *see Abstr.* 2633

631.4 : 625.8 : 551.311.234.3 *see Abstr.* 2634

631.42 2643

The use of the hydrometer for the mechanical analysis of soils. DOWNES, R. G. *J. Coun. Sci. Industr. Res. Aust.*, 17, *pp.* 197–206, *Aug.*, 1944.—The theory of hydrometers is discussed and the various possible sources of error considered. These are: (i) those associated with the relation of density to percentage of soil in suspension; (ii) those associated with the determination of the depth in the suspension at which the density is the same as that measured by the hydrometer; (iii) those due to practical difficulties. Results from a test hydrometer designed to minimize these errors have been compared with results obtained by the standard pipette technique for a number of soils. The mean of all differences expressed as a percentage of the hydrometer reading and irrespective of sign, is about 5%. This may be considered a creditable performance when allowance is made for the differences in dispersion technique used for the two methods. C. J. G.

632.94 : 541.42 *see Abstr.* 2510

661.713 : 532.13 *see Abstr.* 2170, 2171

662.41 : 541.126 *see Abstr.* 2455

662.66 : 539.501 *see Abstr.* 2429

663.63 : 541.132.3 *see Abstr.* 2477

665.3 2644

Industrial uses and marketing problems of tall oil. MCKEE, R. H. *Paper Tr. J.*, 120, *TAPPI Sect.*, *pp.* 35–36, *Jan.* 25, 1945.—Industrial applications include uses in the soap, varnish, paint and textile industries, in cutting oils, lubricants, insect spray, asphalt and disinfectant emulsifiers, and in oils and plastics. Tall oil has now been shown to be a mixture of linolenic and linoleic acids with a small amount of oleic acid, and a non-acidic portion containing 2,2-dihydrostigmasterol and lignoceryl alcohol. The proportions of these vary with the wood, cooking conditions and refining methods used. J. G.

665.52 : 542.48 : 545.727 *see Abstr.* 2545

666.1 : 532.13 : 539.32 *see Abstr.* 2403

666.1 : 539.56 *see Abstr.* 2434

666.1 : 541.132 *see Abstr.* 2473

666.1.038 : 539.319 *see Abstr.* 2401

667.4 2645

Modified pen-and-ink sizing test. SMITH, B. W. *Paper Tr. J.*, 120, *TAPPI Sect.*, *pp.* 72–73, *Feb.* 22, 1945.—Tests for sizing (ink feathering) made with a standard ink may be very unreliable, inasmuch as modern inks vary considerably in their capacity to produce feathering. It is advisable to use (in addition to the TAPPI Standard T431 m black ink) a red, green and violet aq. ink free from and containing 0·25, 0·5, 0·75 and 1·0% of a surface active material (Na_3PO_4, PhOH, or diethylene glycol, respectively). Paper which does not feather with any of these inks containing 0·5% of surface-active reagent is completely satisfactory. The results are independent of the pen point if a ball-pointed nib is used, but each mark should have the form of a heavy right-angled X, each arm of which is at 45° to the paper grain. J. G.

667.7 : 539.574 *see Abstr.* 2435

669.018 : 532.782 *see Abstr.* 2193

669.018 : 539.43 *see Abstr.* 2420

669.14 : 539.62 *see Abstr.* 2438

669.14 : 544 : 535.247.4 *see Abstr.* 2226

669.14 : 548.526 : 539.378.3 *see Abstr.* 2405

669.215 : 541.122.2 *see Abstr.* 2440

669.721 : 539.4.016.3 *see Abstr.* 2418

669.721.5 : 548.73 *see Abstr.* 2594

674.03 : 539.384.4 *see Abstr.* 2409

676 : 620.115 2646

New apparatus for determining the water vapour permeability of sheet materials. CORNWELL, R. T. K. *Paper Tr. J.*, 120, *TAPPI Sect.*, *pp.* 82–93, *March* 1, 1945.—[Abstr. 1811 B (1945)].

676.1 : 541.124 *see Abstr.* 2451

676.2 2647

St. Regis successfully bleaches groundwood. LEE, J. A. *Chem. Metall. Engng*, 51, *pp.* 106–108, 1944.—The use of existing equipment in a newsprint paper mill for bleaching groundwood by the peroxide process, is described. The resulting paper is superior to newsprint made from ordinary groundwood in colour, cleanliness and strength, slightly inferior to it in opacity, and equal to it in other respects. The reagent used contains Na_2O_2 (1–2% on wt. of dry pulp), with Na_2SiO_3 (as detergent, penetrant, stabilizer, and corrosion preventive), and $MgSO_4$ (to prevent catalytic decomposition of the peroxide by the metals present). J. G.

676.3 2648

Use of pyrodextrins in the clay coating of paper. KERR, R. W., AND SCHINK, N. F. *Paper Tr. J.*, 120, *TAPPI Sect.*, *pp.* 77–80, *Feb.* 22, 1945.—The colloidal characteristics of amylopectin are such as to make it more desirable than is amylose for use in clay coatings. Dextrinization involves the linkage of linear chains (from amylose) with branched structures (from amylopectin) to form a pyrodextrin, which has coating qualities superior to either. Thus, pyrodextrins made from corn starch produce clay mixes of low viscosity and plasticity, but high adhesive value, and they are suitable for both low- and high-density coating machines. Advantages of the latter are rapidity of drying, high machine speeds, and a high finish on the final paper. J. G.

676.3 : 535.683.1 2649

Standard testing methods for light fastness in the paper industry. LIPS, H. A. *Paper Tr. J.*, 120, *TAPPI Sect.*, *pp.* 108–110, *March* 15, 1945.—Previous work is reviewed. As a method of standardizing fading lamps, it is proposed that a piece of paper or cloth (the control), suitably dyed, should be exposed to the lamp for 20 hr. and then matched against one of a set of permanently coloured plastic chips which will illustrate the results of 12, 14 etc. to 26 hr. of exposure in a standard lamp. If therefore the control is exposed with the sample for 20 hr. in the lamp to be standardized and again matched against the chips, the exposure time can be reported in terms of the corresponding no. of standard hr. The method may be used to rate exposures to sunlight, and to relate such exposures to fading-lamp tests. J. G.

676.3 : 539.536 *see Abstr.* 2432

676.6 2650

Development of weatherproof, solid fibre board. BARKER, H. T. *Paper Tr. J.*, 120, *TAPPI Sect.*, *pp.* 117–119, *March* 22, 1945.—A brief survey of the development and future possibilities of these boards, with special reference to specifications (caliper, dry and wet bursting strengths, and splitting resistance) for V1, V2 and V3 grades. Asphalted duplex liners provide the cheapest and simplest means of producing high wet strength without loss of rigidity in the wet state. For the measurement of H_2O resistance the Cobb and immersion tests are preferred. Polyvinyl alcohol base adhesives are used for laminating weatherproof boards. Almost as satisfactory, but requiring closer control in use, though much cheaper, is an acid starch which is heated at 90–91°, cooled, and mixed with 5–20% of U–F resin. J. G.

677 : 519.283 : 539.216.1 *see Abstr.* 2386

677 : 539.217.1 *see Abstr.* 2388

677.01 : 539.217.3 : 532.696.1 *see Abstr.* 2187

677.2 : 539.42 : 539.216.1 *see Abstr.* 2385

677.3 : 519.21 *see Abstr.* 2100

677.65 : 539.217.5 *see Abstr.* 2389

678 : 539.388.8 *see Abstr.* 2412

678 : 539.431 *see Abstr.* 2422

678 : 539.501 *see Abstr.* 2430

678.7 : 539.388.8 *see Abstr.* 2413

678.7 : 548.73 *see Abstr.* 2595

679.5 = 3 2651

The formation of synthetic resins from Schiff's bases. I. Resins from aromatic sulphonic acid amines and formaldehyde. II. Further investigations on the nature of sulphonamide resins. SCHEELE, W., AND STEINKE, L. *Kolloid Z.*, 97, *pp.* 176–189, *Nov.*, 1941, *and* 100, *pp.* 361–368, *Sept.*, 1942.

679.5 : 539.217.2 : 539.216.2 *see Abstr.* 2387

679.5 : 539.4.01 *see Abstr.* 2417

679.5 : 539.434 *see Abstr.* 2423

679.5 : 621.383.4 : 539.385.08 *see Abstr.* 2411

679.56 2652

Vulcanization of saturated acrylic resins. MAST, W. C., REHBERG, C. E., DIETZ, T. J., AND FISHER, C. H. *Industr. Engng. Chem.*, 36, *pp.* 1022–1027, *Nov.*, 1944.

679.56 2653

Vulcanized acrylic resins. Copolymers of ethyl acrylate and allyl maleate. MAST, W. C., SMITH, L. T., AND FISHER, C. H. *Industr. Engng Chem.*, 36, *pp.* 1027–1031, *Nov.*, 1944.

681.4 : 535.87 *see Abstr.* 2269

770.1 : 541.141 *see Abstr.* 2486

771.35 : 535.317 *see Abstr.* 2230

771.35 : 535.81 *see Abstr.* 2266

771.37 : 621.383 2654

Direct-reading colour densitometer. SWEET, M. H. *Electronics*, 18, *pp.* 102–106, *March*, 1945.—[Abstr. 2135 B (1945)].

778 : 535.33–31 2655

Spectrographic plates of substantially uniform contrast in the ultra-violet. DAVEY, E. P., AND GAUNTLETT, M. D. *J. Soc. Chem. Ind.*, 64, *pp.* 70–72, *March*, 1945.—It is shown that very strong light absorption by the silver halide in the region 2 500–3 100 Å confines the photographic image largely to the surface of the plate, and that the usual increase in contrast above this wavelength results from a lesser absorption and a greater penetration of the light into the emulsion layer. By restricting the image to the surface here also, while at the same time not decreasing the contrast at lower wavelengths, plates of substantially uniform contrast have been prepared for use in spectrography, and the results of measurements on such a plate are given.

778.3 : 621.386.84 2656

Millionth-of-a-second X-ray snapshots. SLACK, C. M., EHRKE, L. F., AND ZAVALES, C. T. *Westingho. Engr*, 5, *pp.* 99–103, *July*, 1945.—[Abstr. 2169 B (1945)].

778.33 : 621.383 : 621.396.664 2657

Electronic X-ray timer. MORELAND, H. D. *Radio-Electronic Engng*, 4, *pp.* 14–15 *and* 45–46, *June*, 1945.—[Abstr. 2221 B (1945)].